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2013

BICYCLE AND PEDESTRIAN CONNECTIVITY AND LIVABILITY STUDY

Prepared under MassDOT Contract
#69649



Old Colony Planning Council
70 School Street
Brockton, MA 02301

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Introduction

A critical component for understanding walking and bicycling conditions in the region is to first understand the existing environment and provision of accommodations for non-motorized users. As part of this study, a comprehensive inventory of existing and proposed on and off road bicycle and pedestrian facilities within the region was undertaken. Currently, the region has some mixed-use developments and concentrations of development that can make walking and bicycling feasible options for reducing today's automobile trips throughout the region. However, over the last several years, there have been efforts to increase mixed-use developments and Transportation Oriented Developments (TOD) in the Old Colony Region. As a result, many communities are exploring land use decisions with consideration being made to meet the walking and bicycling needs of the population.

Working with the local communities, businesses, non-profit organizations, and the public, the Old Colony Planning Council will use the Bicycle and Pedestrian Connectivity and Livability Study as a mechanism to foster a better understanding of bicycle and pedestrian needs within the region. One of the goals of the Old Colony Planning Council is to improve the quality of life in our communities by integrating transit, bicycle, and pedestrian amenities into residential and commercial/industrial developments. This goal can be achieved by distributing burdens and benefits fairly in the region, promoting public and private collaboration with meaningful community participation, creating partnerships with agencies that have similar goals and objectives, and by providing equitable access to transportation choices for all. Communities, neighborhoods, and downtowns with high levels of pedestrian and bicycle activity are often seen as places that are livable, prosperous, and inviting. This study provides guidance for policies, programs, and investments intended to maximize such results by expanding opportunities for greater walking and bicycling activities in the Old Colony Region now and in the future.

Phase two of the Old Colony Bicycle and Pedestrian Connectivity and Livability Study consists of an in-depth analysis of the existing infrastructure conditions collected during phase one. In addition, identification of best routes for a bike network, recommendations to improve "weak links" in the bicycle and pedestrian network, and prioritization of sites that need improvements will be provided for each community in this study.

Benefits of Bicycling and Walking

Support of bicycling and pedestrian infrastructure and initiatives is based in part on the qualities of transportation modes that support a healthy and sustainable transportation network in the region, a goal of the Old Colony Regional Transportation Plan. Bicycling and walking supports the goals and policies of multiple planning disciplines and governmental roles, including Transportation, Public Health, Environmental, Community Development, and Energy Policy.

Congestion Management: Many of the daily generated vehicle trips on area roadways are short distance trips such as transporting children to school or activities, running errands, etc. While often the destinations of these trips are within reasonable walking or cycling distance, people choose their automobile due to a variety of factors. Some factors are difficult to mitigate, such as a fear of crime, or weather conditions. Some of the factors, such as traffic and infrastructure, can be mitigated with engineering and construction. If more people choose walking or cycling for shorter distance trips, fewer automobiles are added to the roadways, therefore relieving congestion on area streets.

Public Health: The dependence on automobiles for most of our trips has substantially decreased the amount of physical activity of the public and has contributed to a variety of health issues. Physical inactivity not only affects people on personal levels, but its consequential public health issues such as obesity, high blood pressure, and diabetes have an enormous cost to society as well. Supporting bicycling and pedestrian infrastructure and initiatives can provide the public with more opportunity for physical activity, improving their health and productivity.

Environmental: Increase pollution is another negative health impact from increased reliance on motor vehicles. Air pollution from motor vehicles can contribute to asthma and other respiratory ailments on a local level. Vehicle exhaust also contributes to increase greenhouse gases on a global level. When more people walk or bike for their shorter trips (groceries, errands, going to school, etc.) there is less demand on the automobile, hence a decrease in pollution.

Community Development: Walking and cycling connect people to their neighbors and increases a sense of community. Increased interest in “smart growth” and mixed-use development has provided opportunity for new developments to be designed with infrastructure such as sidewalks, pathways, bicycle lockers, and landscape lighting. Such features increase the sense of community among residents and visitors by increasing neighborhood safety and providing enhanced non-motorized transportation access and mobility.

Energy Policy: Increasing worldwide demand for energy, particularly from fossil fuels, in recent years has resulted in increased costs for energy. A well-balanced, multimodal transportation network is a vital component of a responsible energy policy. A variety of transportation options, including well designed and maintained bicycle and pedestrian infrastructure, allows alternatives to personal motor vehicle use and manages energy consumption.

Mode Shift Goal

On October 9, 2012 Massachusetts Department of Transportation (MassDOT) Secretary and CEO Richard A. Davey announced that MassDOT has established a visionary statewide mode shift goal of tripling the share of travel in Massachusetts by bicycling, transit and walking. With the mode shift goal we will achieve positive public health outcomes by providing more healthy transportation options in a time

when our children and adult neighbors are experiencing record rates of obesity. This mode shift goal will help the Old Colony region become more aware of bicycle and pedestrian infrastructures, and it will accelerate the renovations of already implemented bicycle and pedestrian infrastructures.

Plan Development Process

Developing a common set of objectives and strategies is an important part of any planning process as it is the foundation upon which policies, resources, and other actions are based. Objectives are clear, realistic, and measurable statements of action, which when completed, will move towards goal achievement. Objectives describe future expected outcomes or states. They provide programmatic direction and focus on ends rather than means. Strategies are the overall approach to achieving the stated objectives.

The Bicycle and Pedestrian Connectivity and Livability Study objectives and strategies were developed based on the following input components:

1. Bicycle and Pedestrian Task Force Input (49 members):

This task force provides concise and timely reports to the JTC, MPO, and OCPC on issues regarding bicycle/pedestrian travel environment, drafts bicycle and pedestrian planning products; and carries out special bicycle and pedestrian specific projects (walking audits, Bicycle Plans, Bike/Ped Level of Service Inventory, public meetings). The relationship between land use planning, transportation, and economic development is central to this task force, which calls for urban investment, concentrated development patterns, and smart economic growth. The task force meetings are open to the public and anyone from the public can become a member.

2. Community Interviews: The Old Colony Planning Council staff met with engineers, planners, public works and highway staff, police and fire officials, and youth councils to discuss the issues that communities face when it comes to transportation by foot or bicycle. At these focused meetings, the potential data collection routes were defined and presented to the task force members.

Public Participation and Outreach Consultation Process (nearly 300 participants):

During the 2012 Regional Transportation Plan development, public participation was designed to ensure opportunities for the public to express its views on transportation issues and to become active participants in the regional planning and transportation decision-making process. The outreach process consisted of activities designed to build better relationships with



Figure 1: The Task Force met regularly at the OCPC office



Figure 2: Meeting held in the Town of Plymouth



Figure 3: An example of a bicycle outreach activity at the D.W. Field Park

citizens that are engaged with their communities and businesses, along with individuals of “traditionally underserved” groups such as Limited English Proficiency populations, and non-profit organizations. One of the main purposes of the public participation process was to educate and inform stakeholders on new initiatives such as livability, sustainability, and climate change. The process also helped OCPC document local bicycle and pedestrian improvement needs.

Objectives and Strategies

There were two main objectives in phase one of the 2012 Regional Bicycle and Pedestrian Connectivity and Livability Study:

1. To conduct an extensive public participation and outreach process in order to identify the areas of need for bicycle and pedestrian infrastructure improvements, and;
2. To collect the bicycle and pedestrian related data in areas identified by the communities' stakeholders groups.

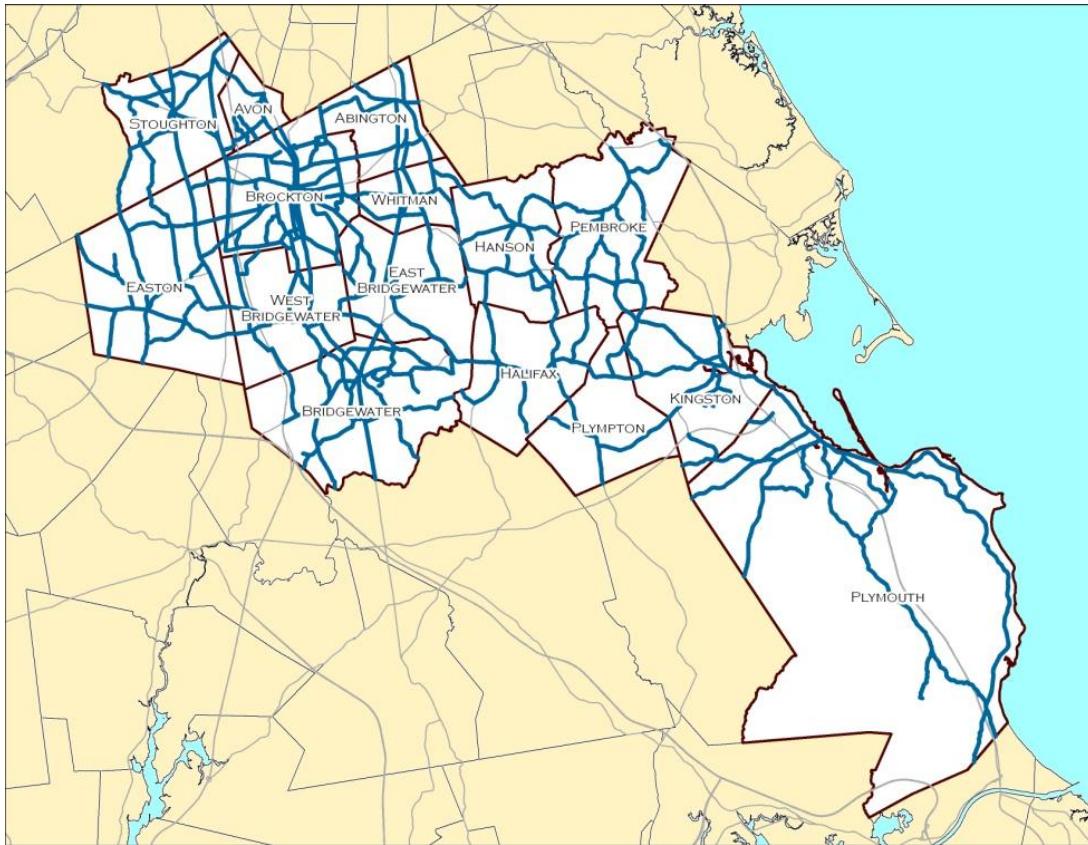


Figure 4: Bicycle and Pedestrian Data Collection Map

The following goals and performance measures were developed during the update of the Regional Transportation Plan. This has a direct correlation to the objectives of the Bicycle and Pedestrian Connectivity and Livability Study.

Goal 1: Enhance and Protect Regional Mobility

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
1 a. Increased bicycle and pedestrian infrastructure networks and amenities in the region	- Pedestrian Compatibility Index (pedestrian level of service) - Bicycle Compatibility Index (bicycle level of service)	- By 2015, determine bicycle and pedestrian short and long term infrastructure projects. - By 2020, complete 40% of short-term infrastructure projects identified in the 2011 Bicycle Connectivity Study - By 2035, implement 50% of the identified long-term bicycle and pedestrian projects
1 b. Increased multimodal transportation centers (Transit Oriented Development) that serve business, residential, and mixed-use developments	- Support the development of TODs in Kingston, Plymouth, Bridgewater, Hanson, and Easton Commuter Rail stations	- By 2035, Kingston, Plymouth, Halifax, Hanson, Whitman, and Easton Commuter Rail stations will be TOD designated

Goal 2: Foster Sustainable, Healthy, and Livable Communities

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
2a. Improved networks that accommodate pedestrians and bicycles	- Pedestrian Compatibility Index (pedestrian level of service) - Bicycle Compatibility Index (bicycle level of service)	- By 2035, create a contiguous, region-wide network of sidewalks, walkways, bicycle paths, and bicycle lanes - By 2035, bring Pedestrian Level of Service B or better at intersections with high pedestrian activity
2b. Revitalized downtowns and town centers	- Additional mixed-used developments with bicycle and pedestrian amenities in downtowns and town centers	- Support local initiatives, which enact, implement and enforce laws and regulations regarding pedestrian and bicycle traffic in downtowns. - Support policies that encourage cluster development. - By 2035, Kingston, Plymouth, Hanson, Whitman, and Easton Commuter Rail stations will be in designated TODs

Goal 3: Ensure Equity and Public Participation

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
3 a. Improved public participation and awareness of new initiatives and programs	- Number of active multidisciplinary task forces - Number of surveys and feedback forms during the year	- Meet quarterly with stakeholders and the public to discuss key Environmental Justice issues on Sustainability and Livability, bicycle and pedestrian, regional mobility, and climate change - Develop surveys during the year to collect public opinion on different transportation issues
3 b. Partnered with other agencies with similar goals and objectives	- List of existing and potential partners	- Extended partnerships with agencies that have similar goals and objectives

Goal 4: Improve Transportation Safety and Security

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
4 a. Reduced transportation-related fatalities	- Annual crash data report - Road safety audits	- Reduce the number of transportation-related fatalities in the Old Colony region by 40 percent in 2035 compared to 2008.
4 b. Reduced transportation-related injuries	- Annual crash data report - Road safety audits	- Reduce the number of transportation-related accidents in the Old Colony region by 20 percent in 2035 compared to 2008.

Goal 5: Promote Environmental Protection and Climate Change Adaptation

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
5 a. Reduced carbon emissions, improved energy efficiency, and reduced dependence on oil	- 1993 to 2008 Department of Motor Vehicle (Average Vehicular Daily Miles Traveled in the Old Colony region)	- Reduce fuel consumption per vehicle-miles traveled, per passenger miles traveled, and per (net) freight ton-mile - Increase percent of transit vehicles using alternative fuels - By 2035, stop increasing greenhouse emissions - By 2035, reduce average daily miles traveled to 10% below 2008 - By 2035, increase the use of transit by 20% compared to 2000
5 b. Increased the use of environmentally sustainable practices in transportation to prevent climate change effects	- Data comparison of 2000 and 2010 US Census Journey to Work data	- Increase carpool/vanpool and non-motorized transportation modes such as bicycle and walking compared to 2000 census - By 2035, upgrade 20% of the drainage systems in areas identified as high risk in the Climate Change Study
5 c. Increased development of waste water treatment capacity and drainage systems	- Climate Change Roadway Drainage and Runoff Program	

Goal 6: Promote Policies that Ensure Economic Vitality and Sustainability

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
6 a. Increased mixed use centers, re-use of existing infrastructures, and transit oriented development districts in the Old Colony region	- Number of Transit Oriented Development Studies - Number of Economic Development Studies - Number of projects under Chapter 40B of the state's affordable housing law and the 40R Smart Growth Act - Number of Brownfield projects	- By 2035, Plymouth, Halifax, Hanson, Whitman, and Easton Commuter Rail stations will be TOD designated - By 2035, all OCPC communities will have overlay districts that encourage economic development
6 b. Pursued policies of sustainable development	- Number of communities that opt to modify their subdivision rules and regulations to require bicycle/pedestrian easements to tie into a binding adopted region-wide bicycle/pedestrian system	- Revision of local Subdivision Rules and Regulations to require bicycle/pedestrian easements and paths to adjacent property, located so as to tie into binding adopted region-wide bicycle/pedestrian system

Safe Routes to School (SRTS)

The Massachusetts Safe Routes to School Program encourages safe, healthy trip options for travel to and from school. The program collaborates with superintendents, public officials, principals, teachers, school organizations, students, community stakeholders, and neighbors. Successful Safe Routes to School initiatives include the five E's: education, encouragement, enforcement, engineering, and evaluation. It is the goal of the Old Colony Planning Council to encourage all the schools in our region to enroll into the SRTS Program. A list of the schools already enrolled in the SRTS Program is as follows:

Abington – Center School, Woodsdale Elementary School

Brockton – Brookfield Elementary School, Davis K-8 School, Downey Elementary, Hancock Elementary school, John F. Kennedy School, Raymond School

East Bridgewater – Central Elementary School, Mitchell Middle School

Easton – F.L. Olmstead School, H.H. Richardson School

Halifax – Halifax Elementary School

Hanson – Indian Head School, Maquan Elementary School

Pembroke – North Pembroke Elementary School

Plymouth – Federal Furnace Elementary School, Hedge Elementary School

Stoughton – J.H. Gibbons Elementary School, Joseph R. Dawe Jr. Elementary School

West Bridgewater – Howard School, Rose L. MacDonald School, Spring Street School

GreenDOT

The GreenDOT policy objectives include reducing GHG emissions, promoting healthy transportation options, and supporting smart growth. Along with these objectives, there are 16 sustainable goals of GreenDOT. Of the 16, there are 7 that directly relate to bicycling and walking. They are as follows:

- Reduce greenhouse gas emissions
- Improve statewide air quality
- Consume less energy
- Increase reliance on renewable energy
- Design a multi-modal transportation system
- Promote healthy transportation + livable communities
- Triple mode share of bicycling, transit + walking

Existing Conditions

Sidewalks

According to the Massachusetts Road Inventory File, the Old Colony region has over 390 miles of roadway with a sidewalk on at least one side of the street. Most of the main roadways in the region have a sidewalk on at least one side. However, there are many smaller roadways, particularly in more rural areas, where sidewalks are not present. In some cases a worn footpath exists along the side of the roadway, and in others pedestrians share the roadway with vehicles.

Existing Walking Paths and Trails

Several parks, nature areas, and recreation areas throughout the region feature walking and shared use paths. These areas include:

- Ames Nowell State Park, Abington
- Borderland State Park, Easton
- D.W. Field Park, Brockton and Avon
- Myles Standish State Forest, Plymouth

In addition to these major areas, several smaller parks and conservation areas exist in each of the towns, many providing pedestrian trails and paths.

Bridgewater State University has a network of paved footpaths connecting campus buildings, parking areas, and the Bridgewater MBTA Commuter Rail Station.

Signalized Intersections

Signalized intersections often present the best opportunity for bicyclists and pedestrians alike to cross a street as they provide ordered and predictable traffic control. Features such as crosswalks, pedestrian call buttons, pedestrian “walk” / “don’t walk” signals, pedestrian countdown signals, bicycle detection loops, and accessible controls for the vision and hearing impaired are some features that further facilitate bicycle and pedestrian movements at signalized intersections. Appendix A of this report contains a complete listing of traffic signals throughout the region, and summarizes the bicycle and pedestrian amenities, if any, included within the individual systems. Appendix B contains maps that graphically summarize this data on maps of the Region.

Intermodal Connections

There are twelve MBTA Commuter Rail Stations, two local Regional Transit Agency hubs (BAT Intermodal Centre in Downtown Brockton and PAL/GATRA Hub at Memorial Hall in Plymouth), and six Park-and-Ride (intra-city bus) stations within the Old Colony Region. Additionally, three Commuter Rail stations (South Weymouth, Holbrook/Randolph, and Middleborough/Lakeville) and two Park-and-Ride stations (Rockland, Bourne) that are located beyond the borders of the Region are also monitored in the Old Colony Congestion Management Process. All of the MBTA Commuter Rail Stations are equipped with bike racks, as is the Brockton Area Transit Intermodal Centre. Additionally, most stations are accessible to pedestrians and the disabled, however ease of connections and distance from the main roadway vary

from station to station.

Long Distance Routes

Claire Saltonstall Boston to Cape Cod Bikeway: The Claire Saltonstall Bikeway, also known as the Boston to Cape Cod Bikeway, is a 135-mile bikeway marked on signs and official maps as Bike Route 1. It starts on the Charles River Bikeway in Boston; and, travels along a network of off-road bike paths, back roads, and secondary highways to its terminus in Provincetown. Dual signs are provided along the route, one with a picture of a bicycle on a green background and the number "1" in green below the picture, and another rectangular sign with the words "Claire Saltonstall Bikeway" below. These signs were erected after the official legislative act in 1978 naming the bike route. Few of these signs, however, remain today. In order to follow the route, riders need a map detailing where the route follows.

Within the Old Colony Region, the Claire Saltonstall Boston to Cape Cod Bikeway travels through Avon, Brockton, East Bridgewater, Halifax, Plympton, Kingston, and Plymouth.

Bay Circuit Trail: The Bay Circuit Trail (BCT) is a two hundred mile long recreation trail connecting parks, open spaces, and waterways in eastern Massachusetts. First proposed in 1929 as an outer "emerald necklace," the route stretches from Plum Island in Newburyport on the North Shore to Kingston Bay, traversing 50 cities and towns. Approximately 150 miles of the trail have been completed. The BCT varies in surface type, from earthen hiking trails to paved shared-use trails.

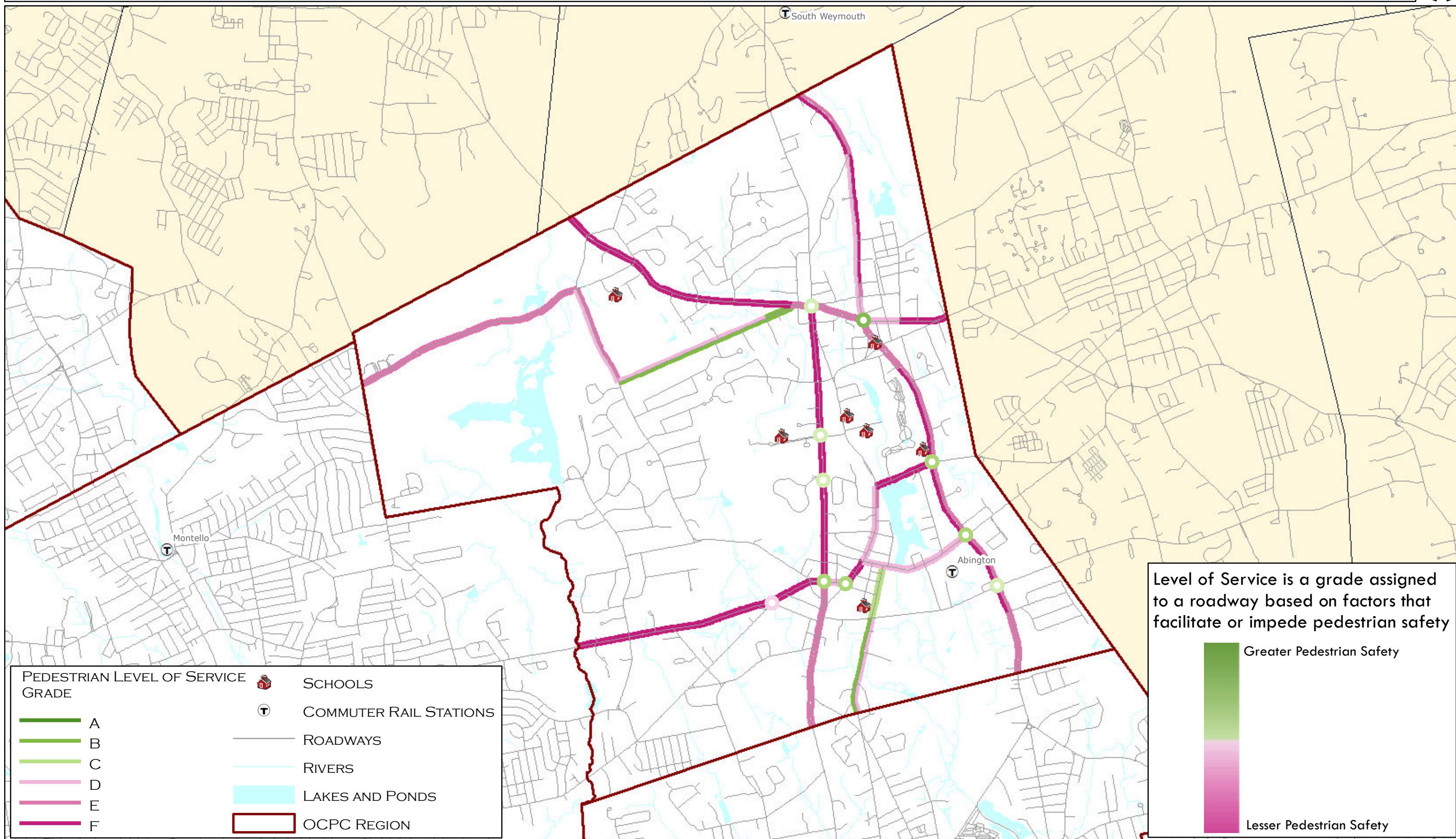
In the Old Colony Region, the Bay Circuit Trail runs through Easton, West Bridgewater, Bridgewater, East Bridgewater, Hanson, Pembroke, and Kingston. Aside from a gap in Bridgewater and East Bridgewater, where a trail connection is proposed but not open, the trail creates a contiguous path from the western border of the region (the Easton/Sharon Town Line) to Kingston Bay.

Inventory and Analysis

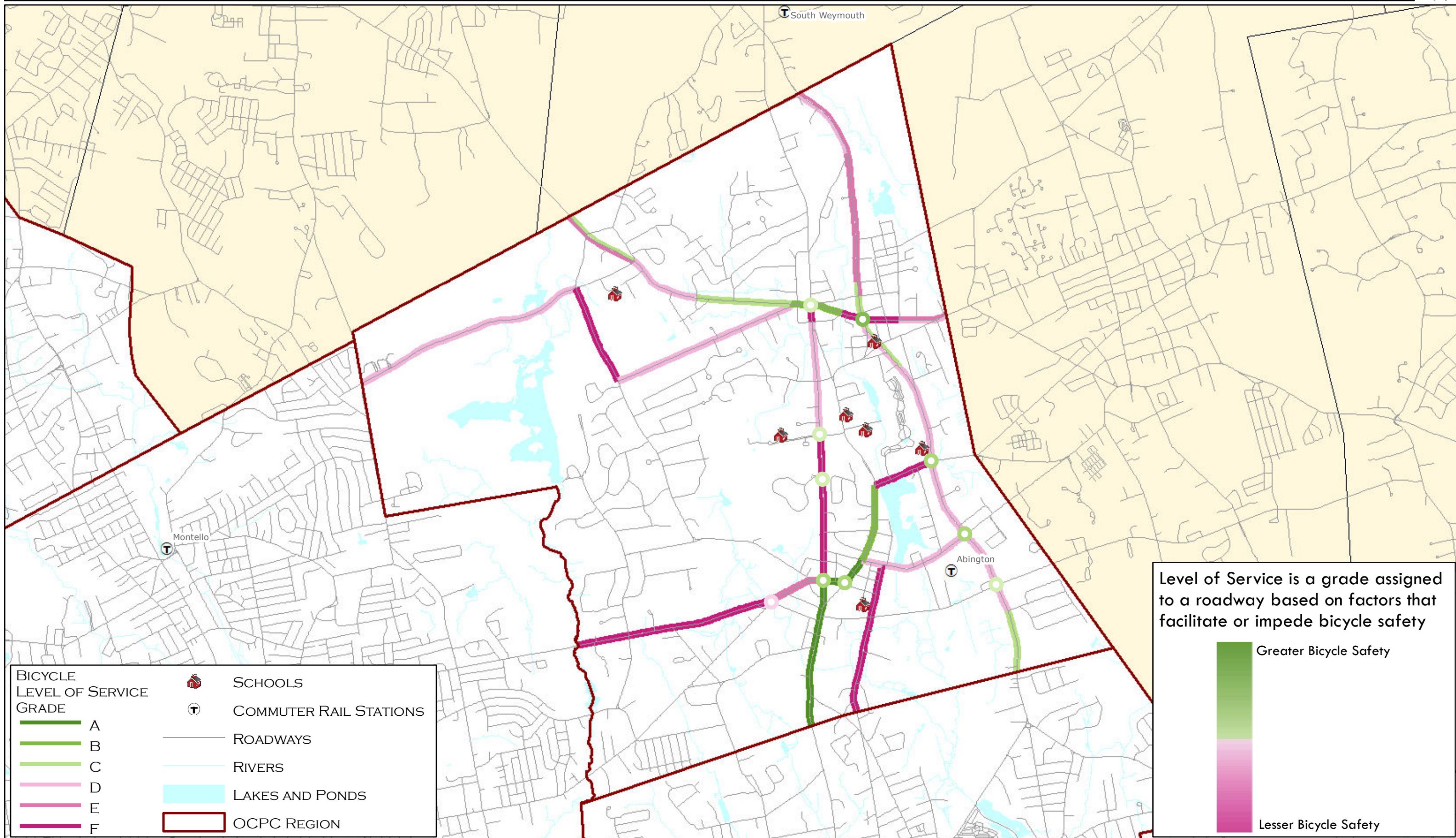
As part of the Bicycle and Pedestrian Connectivity and Livability Study, the Old Colony Planning Council has developed a complete inventory of Bicycle Levels of Service (BLOS), Pedestrian Levels of Service (PLOS), and Pedestrian Infrastructure Index (PII) on the state numbered route network and other roadways identified as priority routes by community representatives and/or the Regional Bicycle and Pedestrian Task Force members. OCPC Staff will maintain this inventory on a continuing basis, updating information as it becomes available and as existing infrastructure changes. By 2035, the goal is to have a contiguous, region-wide network of bicycle paths and bicycle lanes, and a locally completed sidewalk system in urbanized areas. In addition, by 2035 the goal is also to improve the intersections with high pedestrian activity to pedestrian level of service B or better.

The following maps reflect both the pedestrian and bicycle infrastructure existing conditions of the areas selected in the Old Colony region. These maps include the level of service along street segments and at signalized intersections. Following the Level of Service maps are the maps of each town highlighting some bicycle and pedestrian recommendations. The maps of the communities are presented in alphabetical order.

ABINGTON PEDESTRIAN LEVEL OF SERVICE



ABINGTON BICYCLE LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

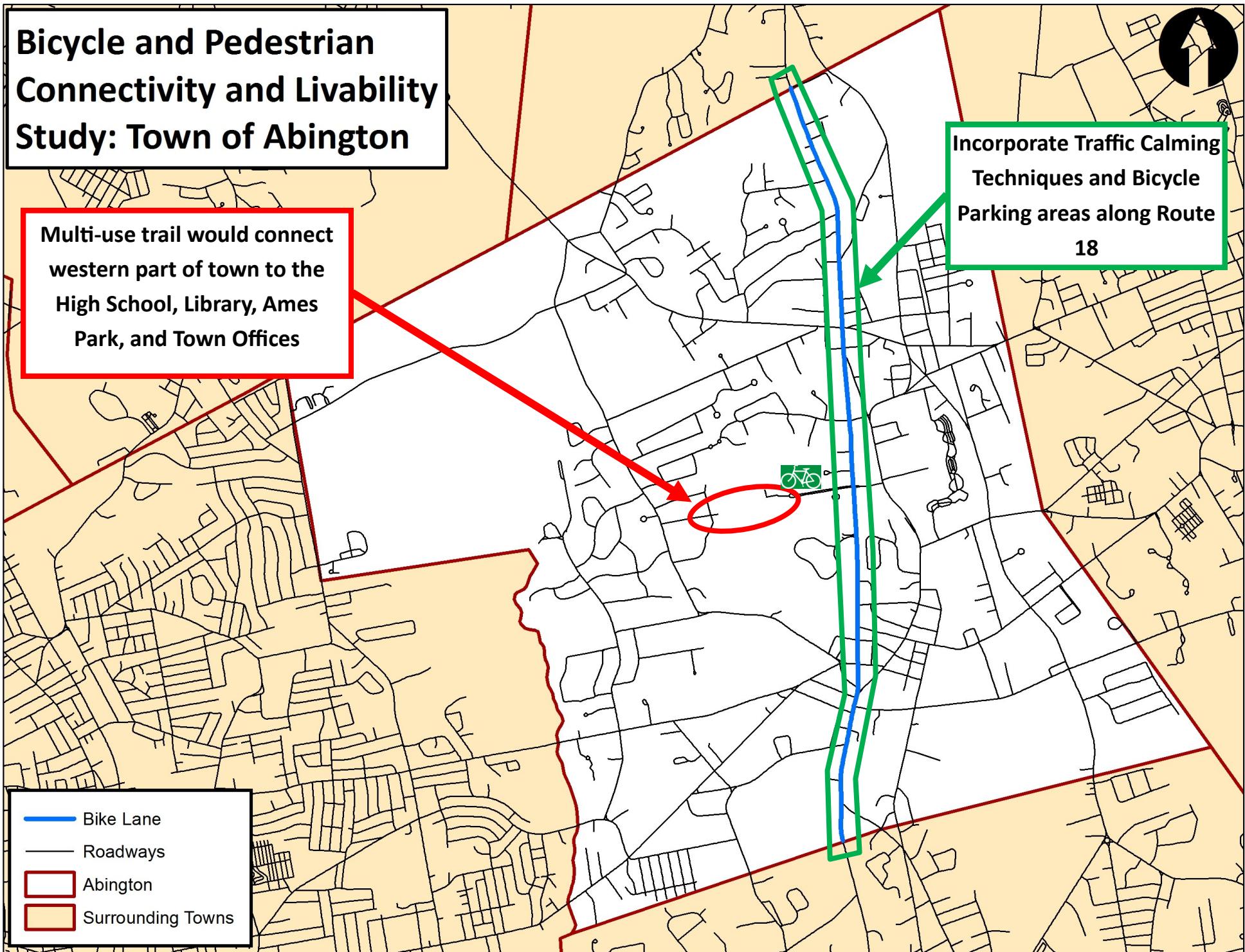
DECEMBER 2012

Bicycle and Pedestrian Connectivity and Livability Study: Town of Abington



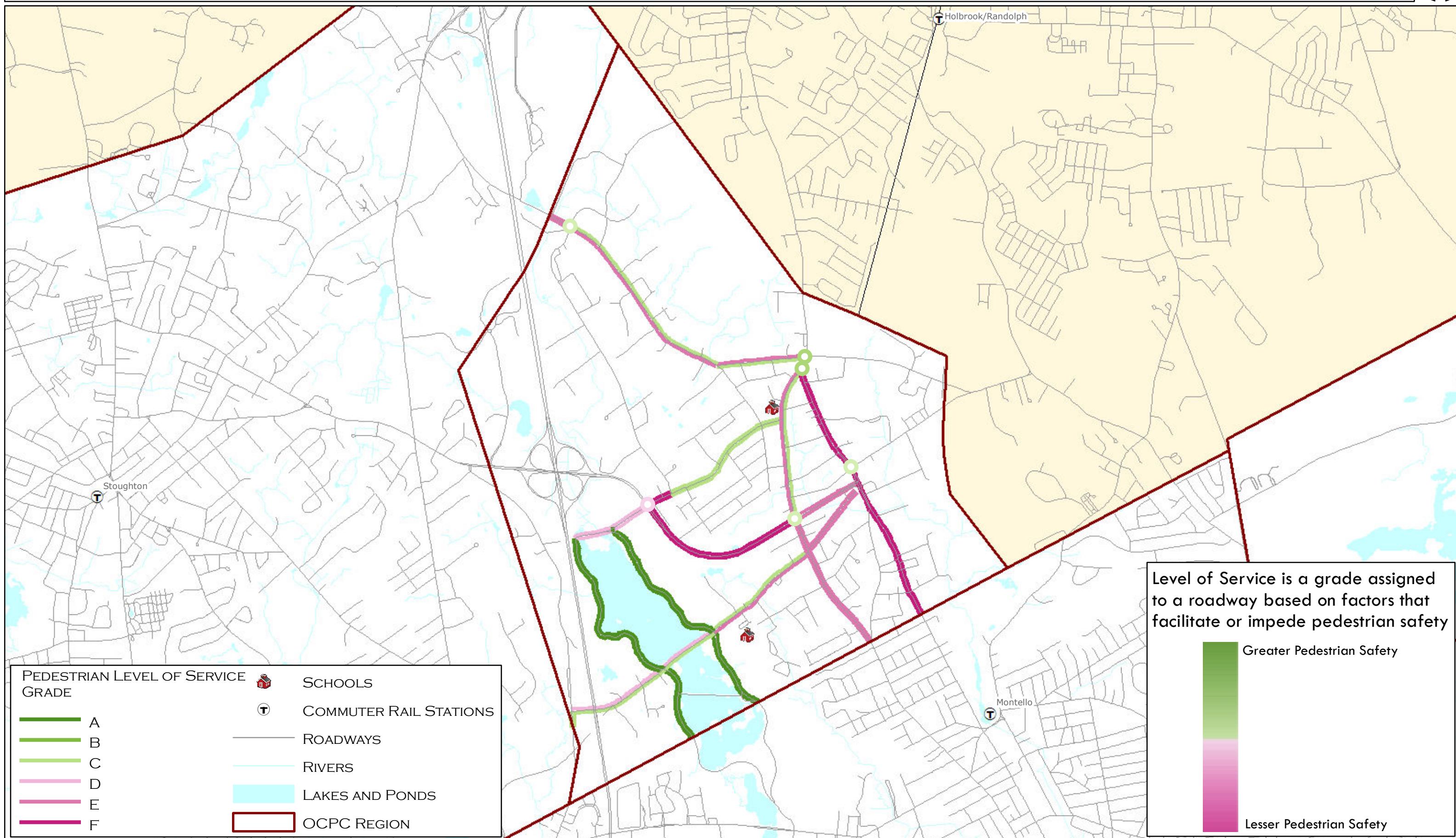
Multi-use trail would connect western part of town to the High School, Library, Ames Park, and Town Offices

Incorporate Traffic Calming Techniques and Bicycle Parking areas along Route 18

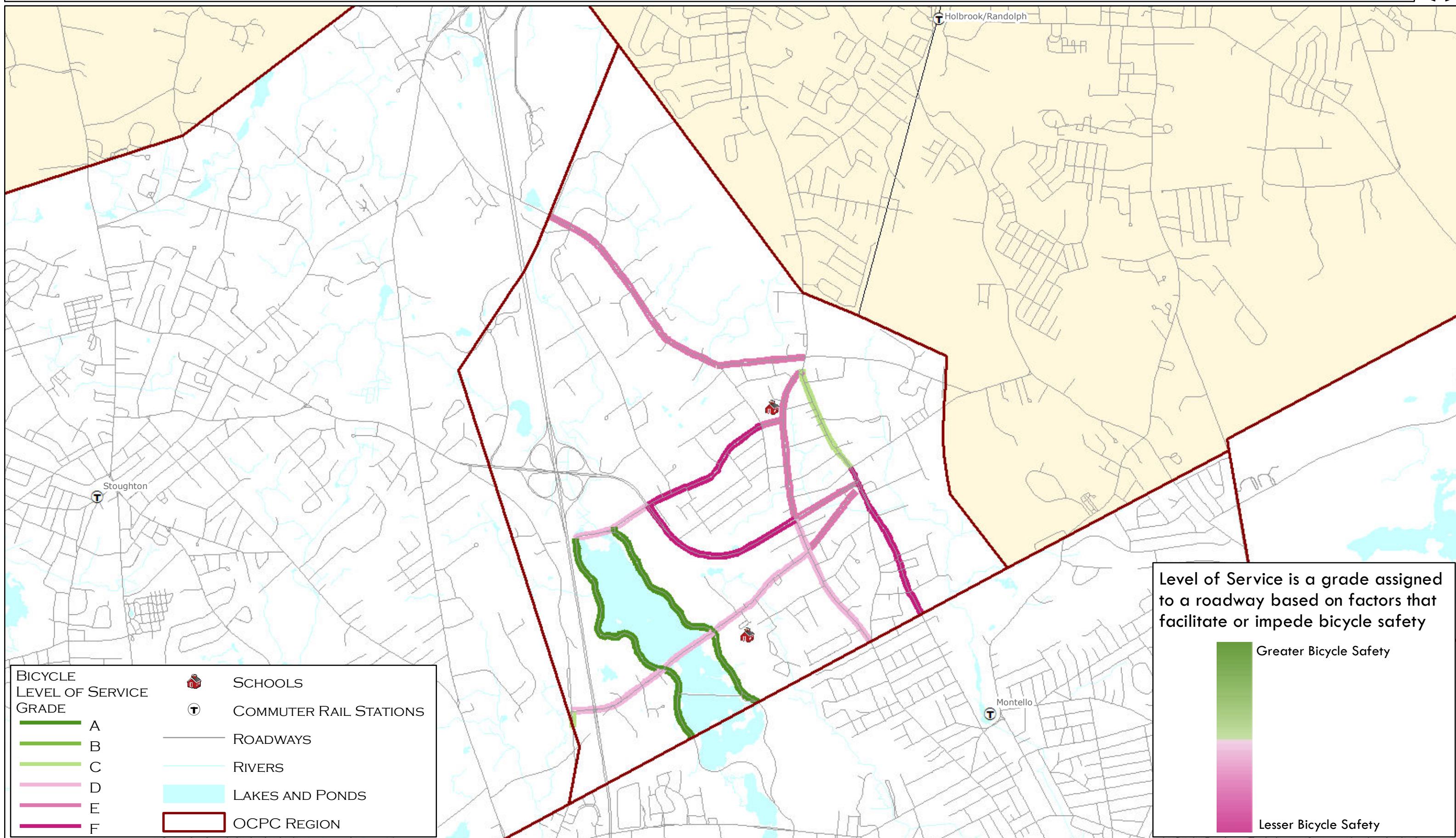


— Bike Lane
— Roadways
Abington
Surrounding Towns

AVON PEDESTRIAN LEVEL OF SERVICE



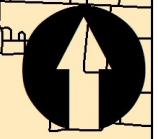
AVON BICYCLE LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

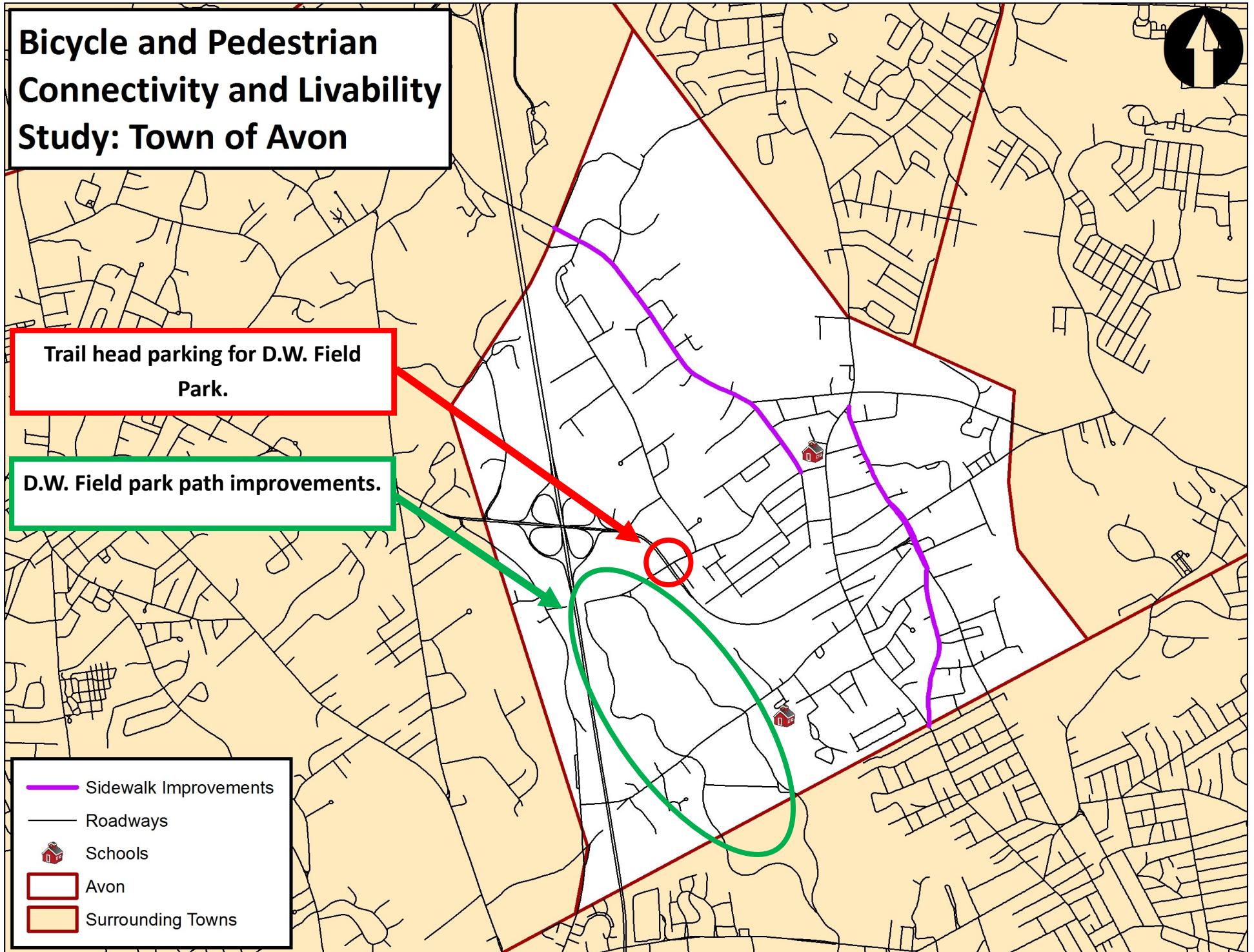
Bicycle and Pedestrian Connectivity and Livability Study: Town of Avon



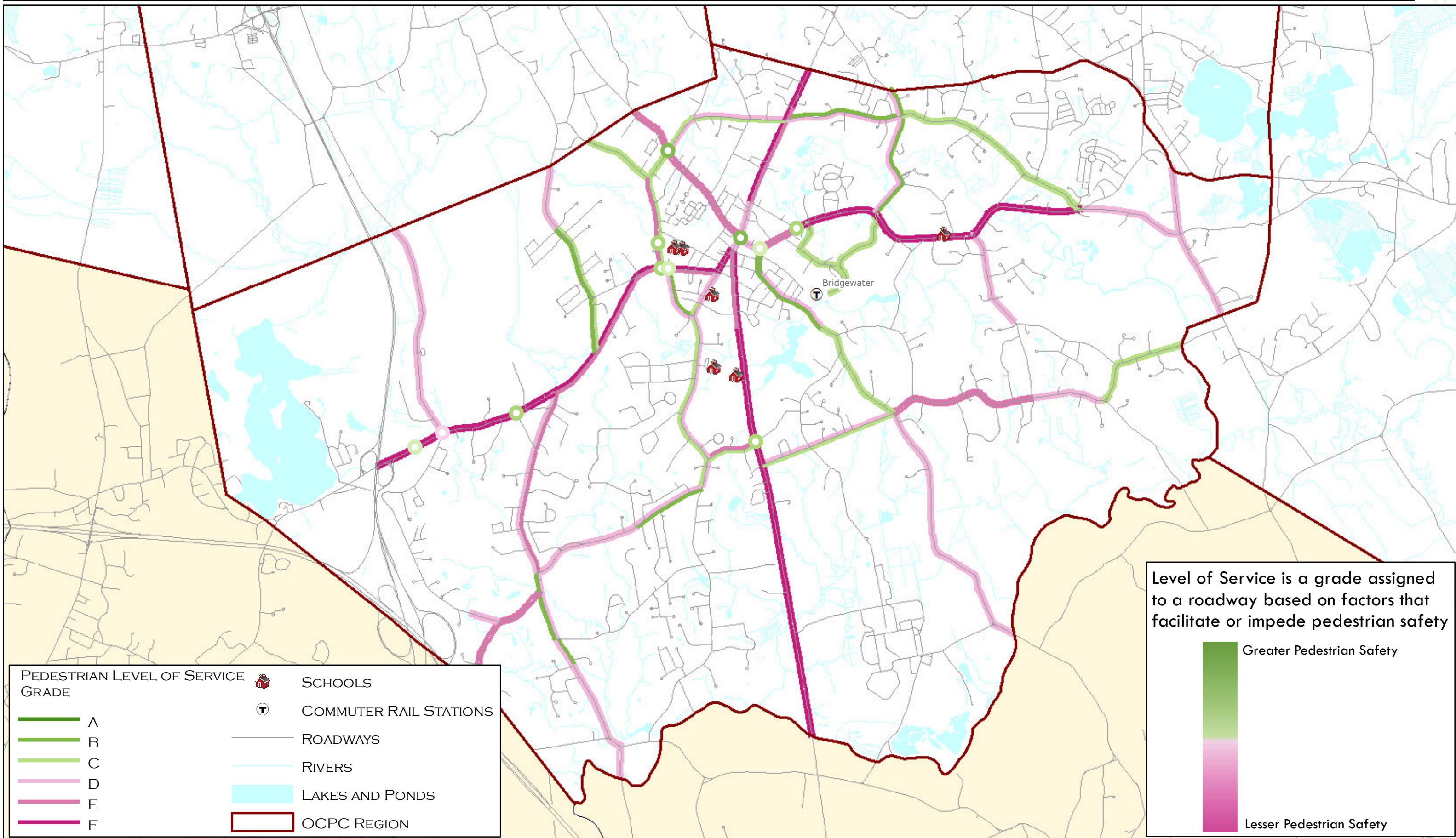
Trail head parking for D.W. Field Park.

D.W. Field park path improvements.

- Sidewalk Improvements
- Roadways
-  Schools
-  Avon
-  Surrounding Towns



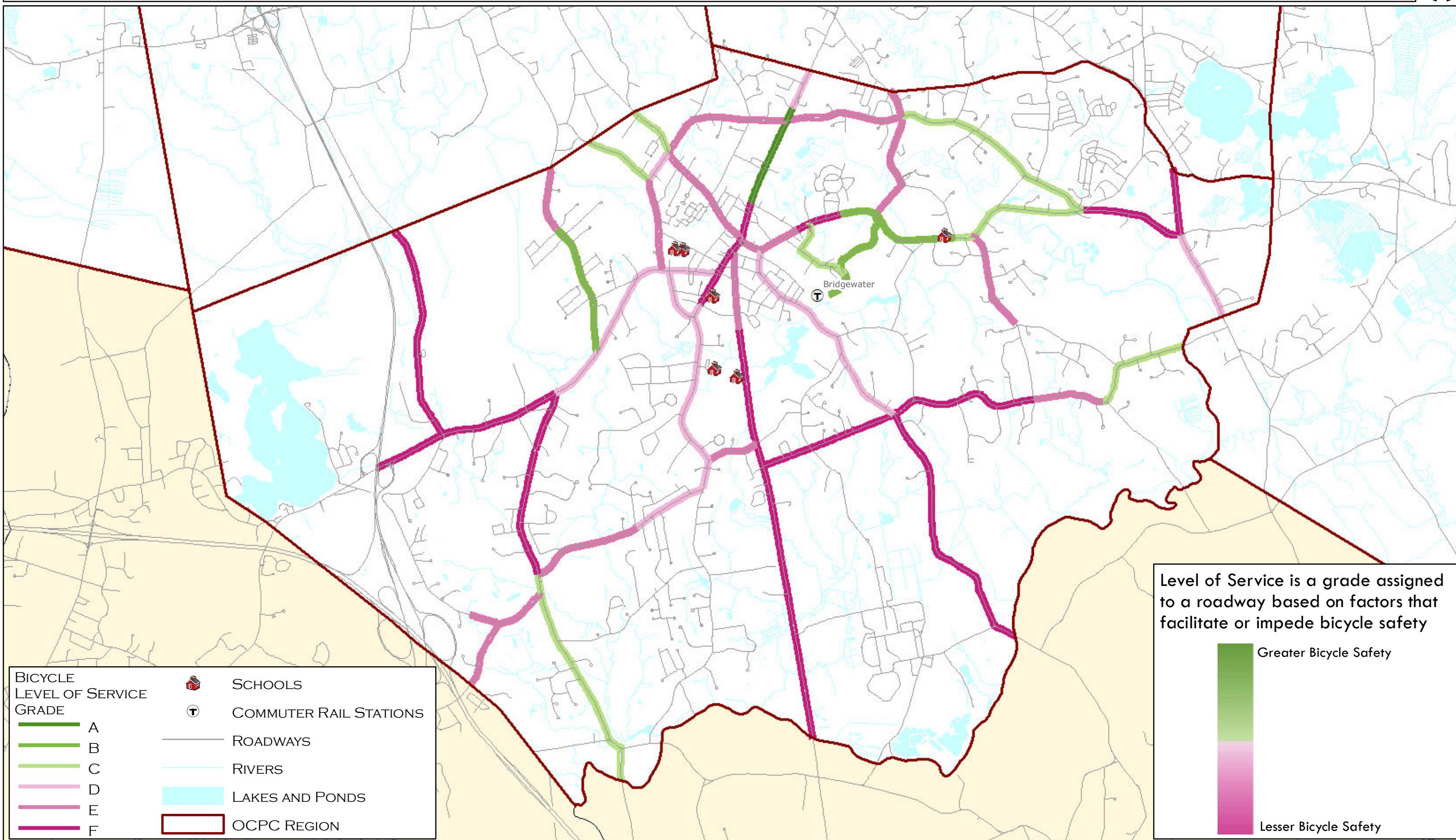
BRIDGEWATER PEDESTRIAN LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

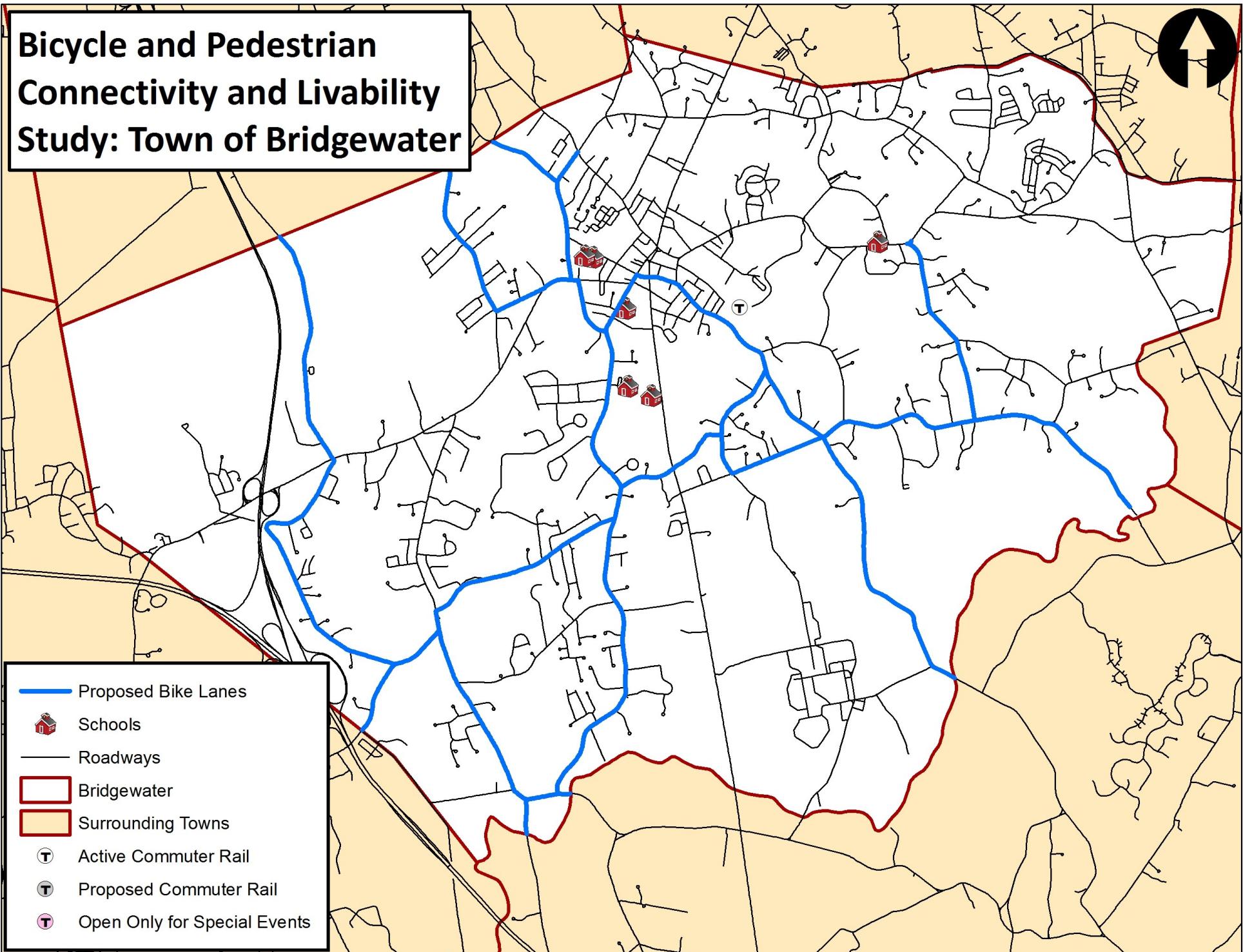
BRIDGEWATER BICYCLE LEVEL OF SERVICE



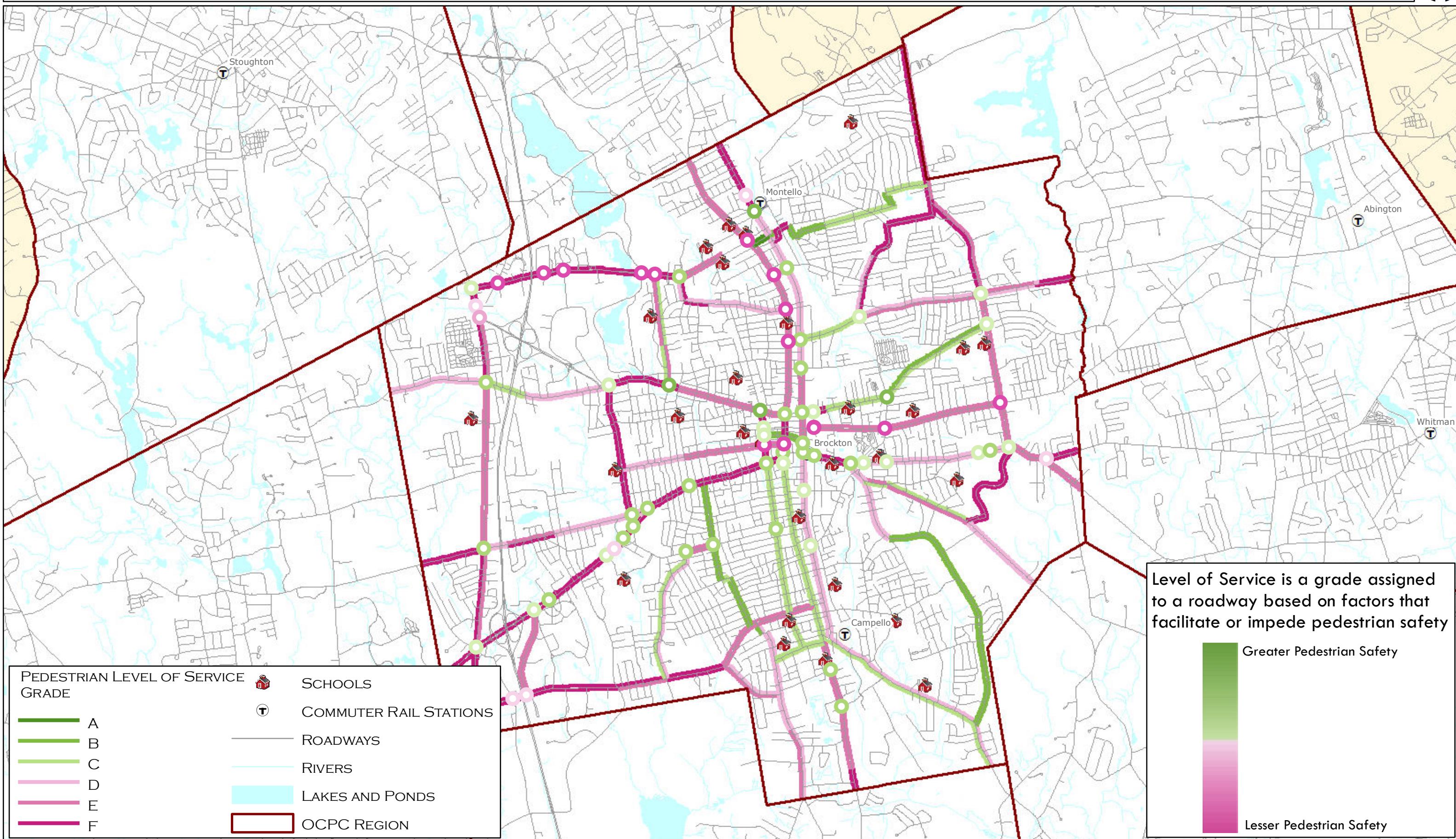
OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

Bicycle and Pedestrian Connectivity and Livability Study: Town of Bridgewater



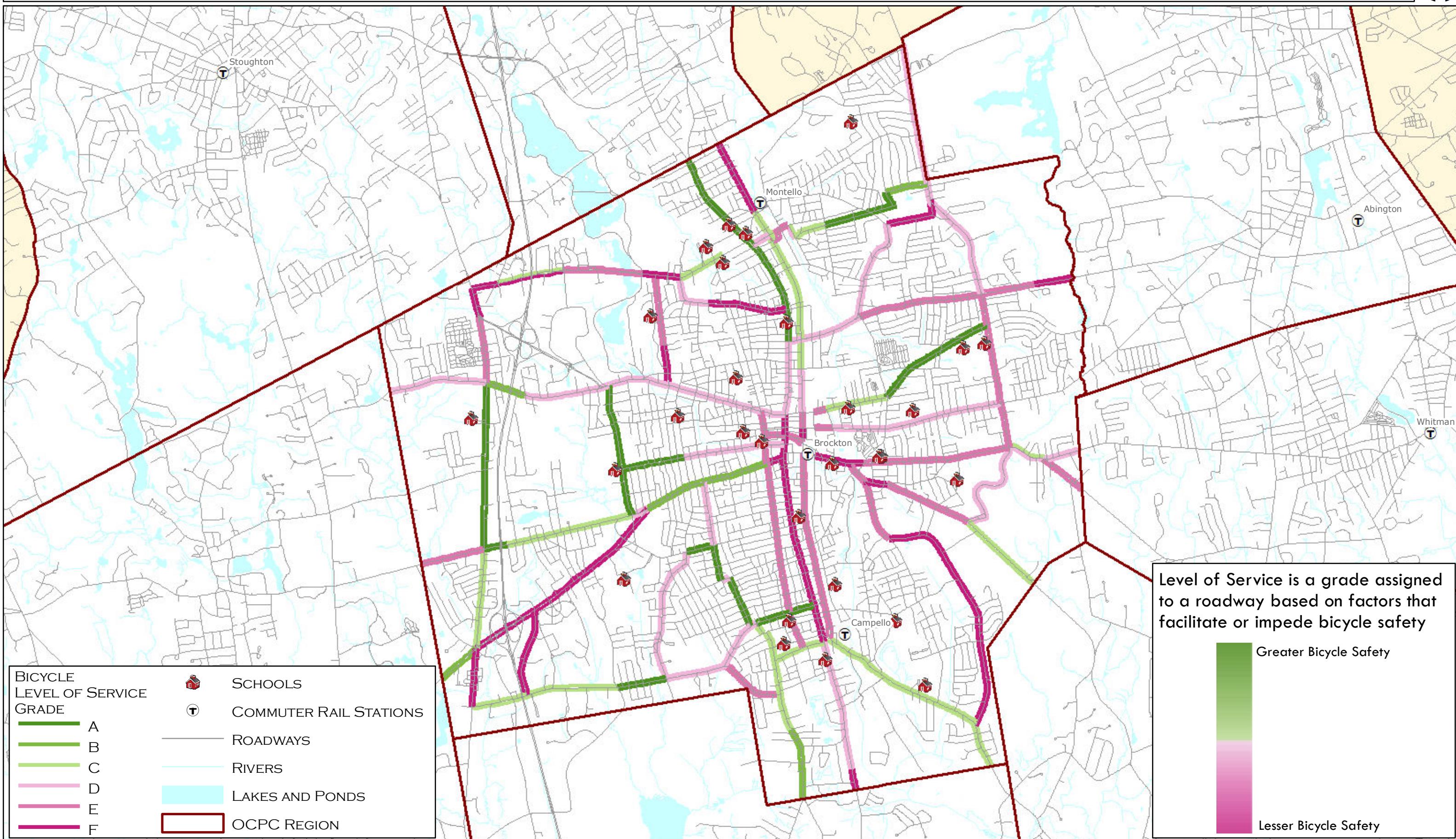
BROCKTON PEDESTRIAN LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

BROCKTON BICYCLE LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301

GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

Bicycle and Pedestrian Connectivity and Livability Study: Town of Brockton

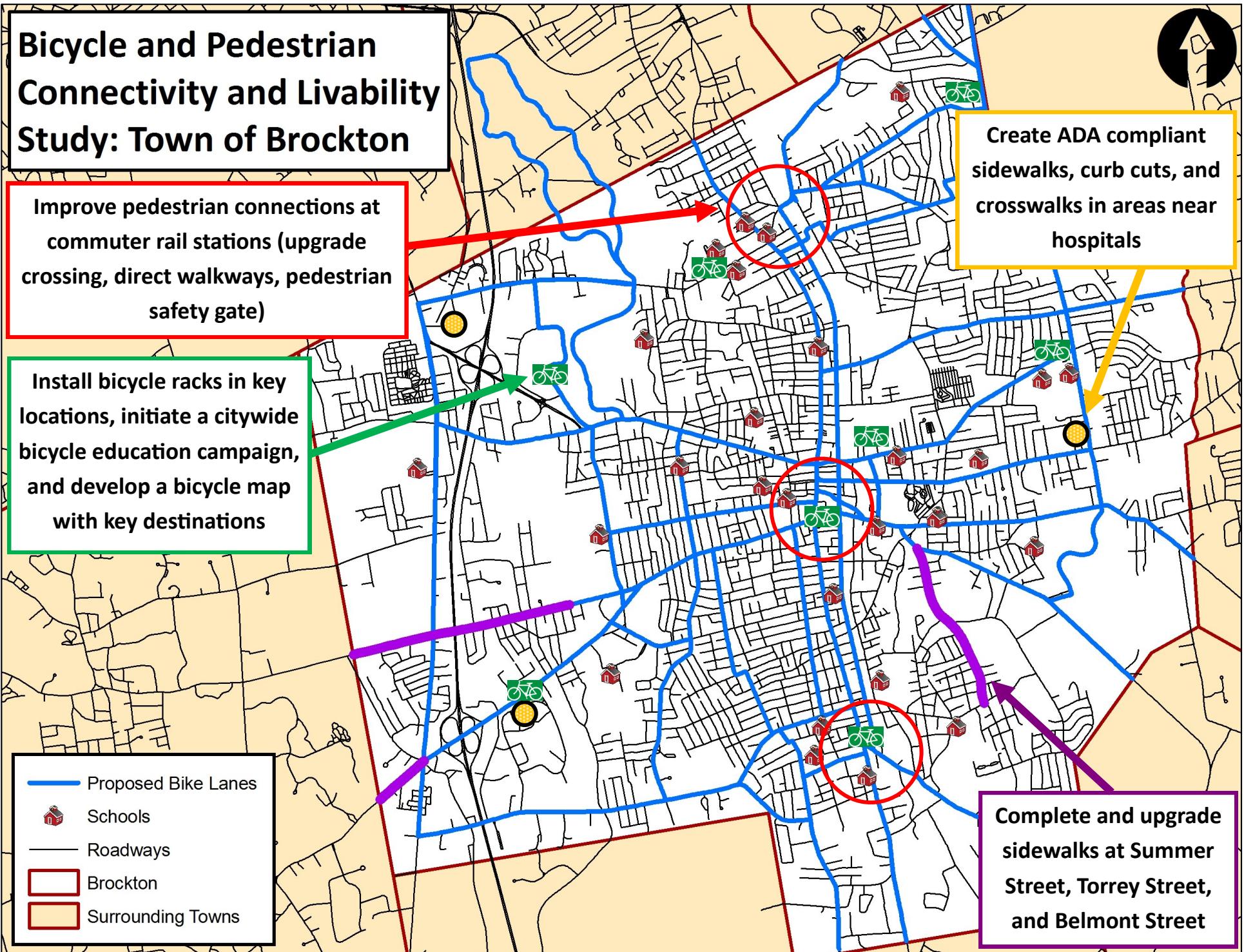
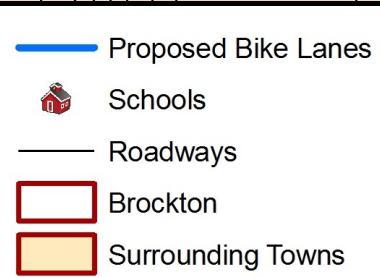


Improve pedestrian connections at commuter rail stations (upgrade crossing, direct walkways, pedestrian safety gate)

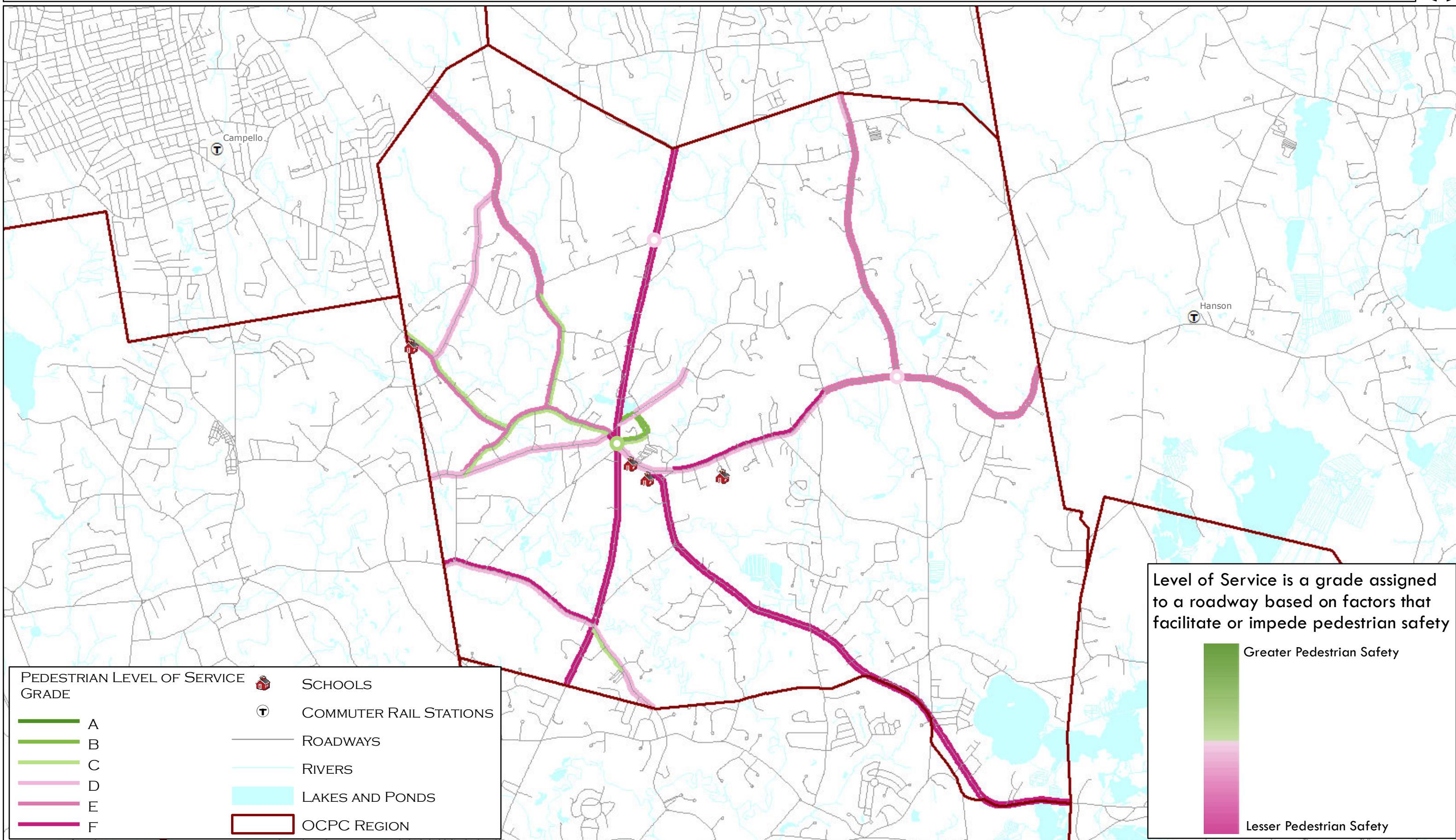
Install bicycle racks in key locations, initiate a citywide bicycle education campaign, and develop a bicycle map with key destinations

Create ADA compliant sidewalks, curb cuts, and crosswalks in areas near hospitals

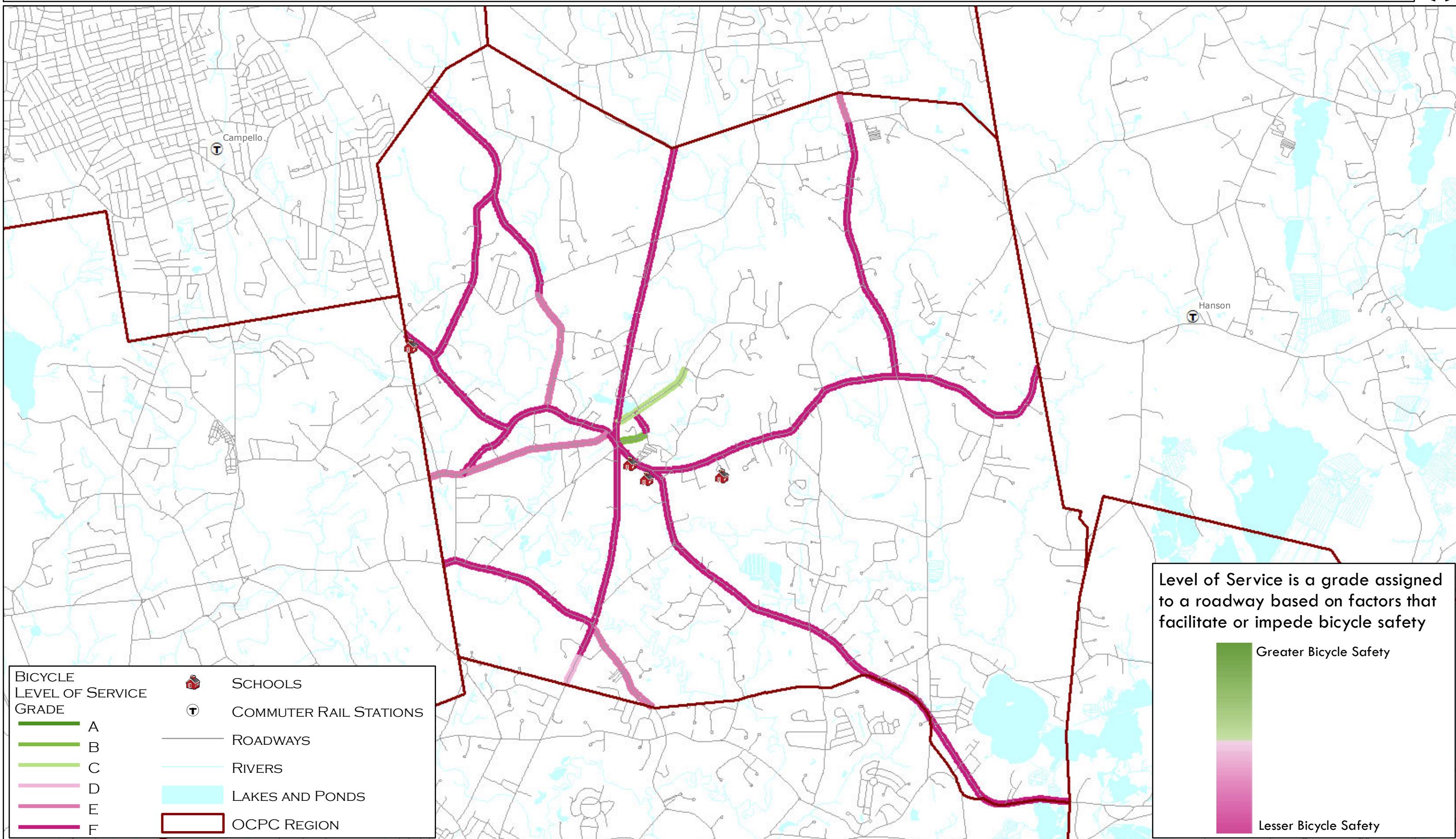
Complete and upgrade sidewalks at Summer Street, Torrey Street, and Belmont Street



EAST BRIDGEWATER PEDESTRIAN LEVEL OF SERVICE



EAST BRIDGEWATER BICYCLE LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

Bicycle and Pedestrian Connectivity and Livability Study: Town of East Bridgewater

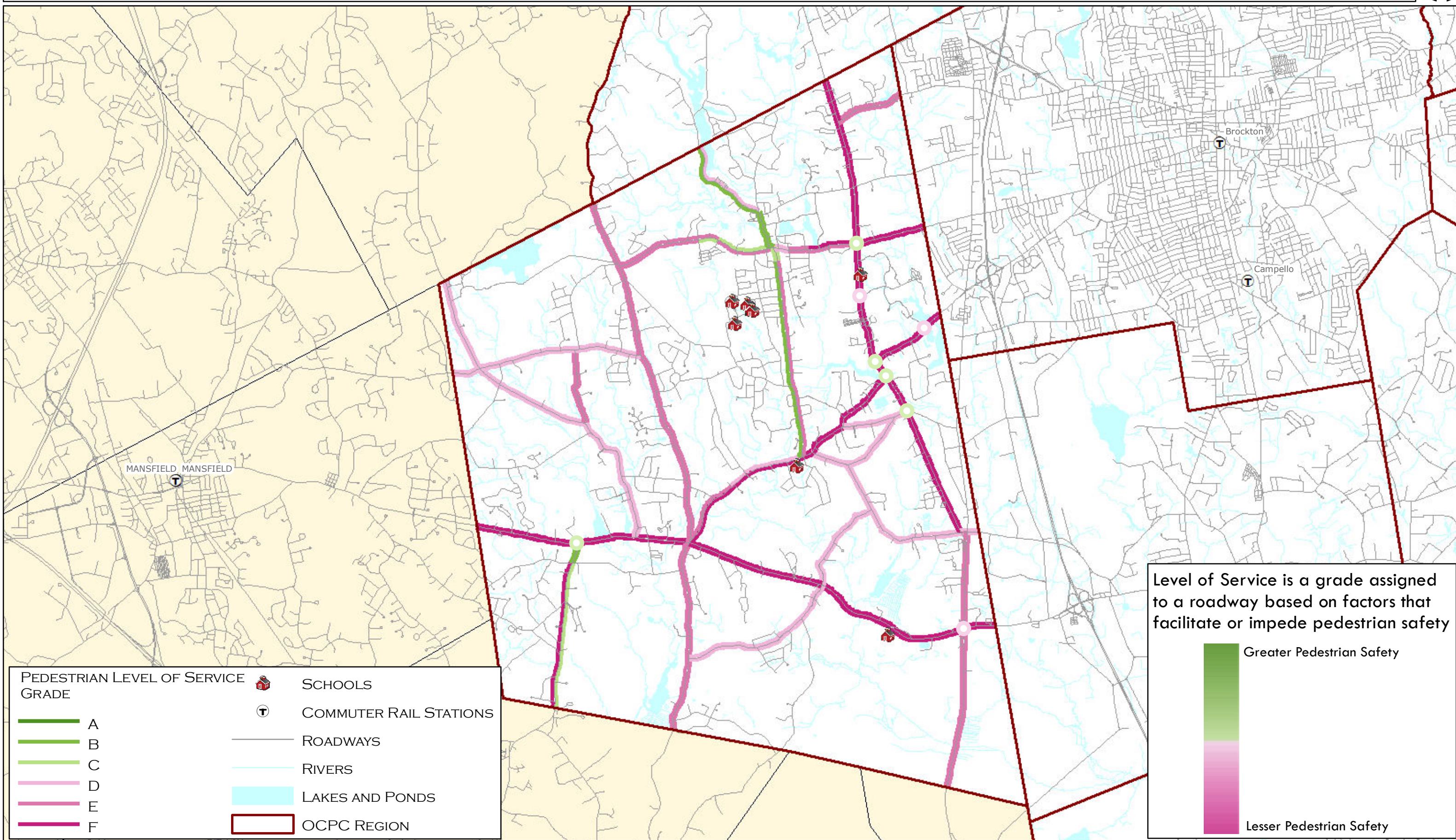
Install sidewalks from
Whitman to Bridgewater
along Route 18

Streetscape improvements
at Town Center (sidewalks,
sharrows, improved street
crossings)

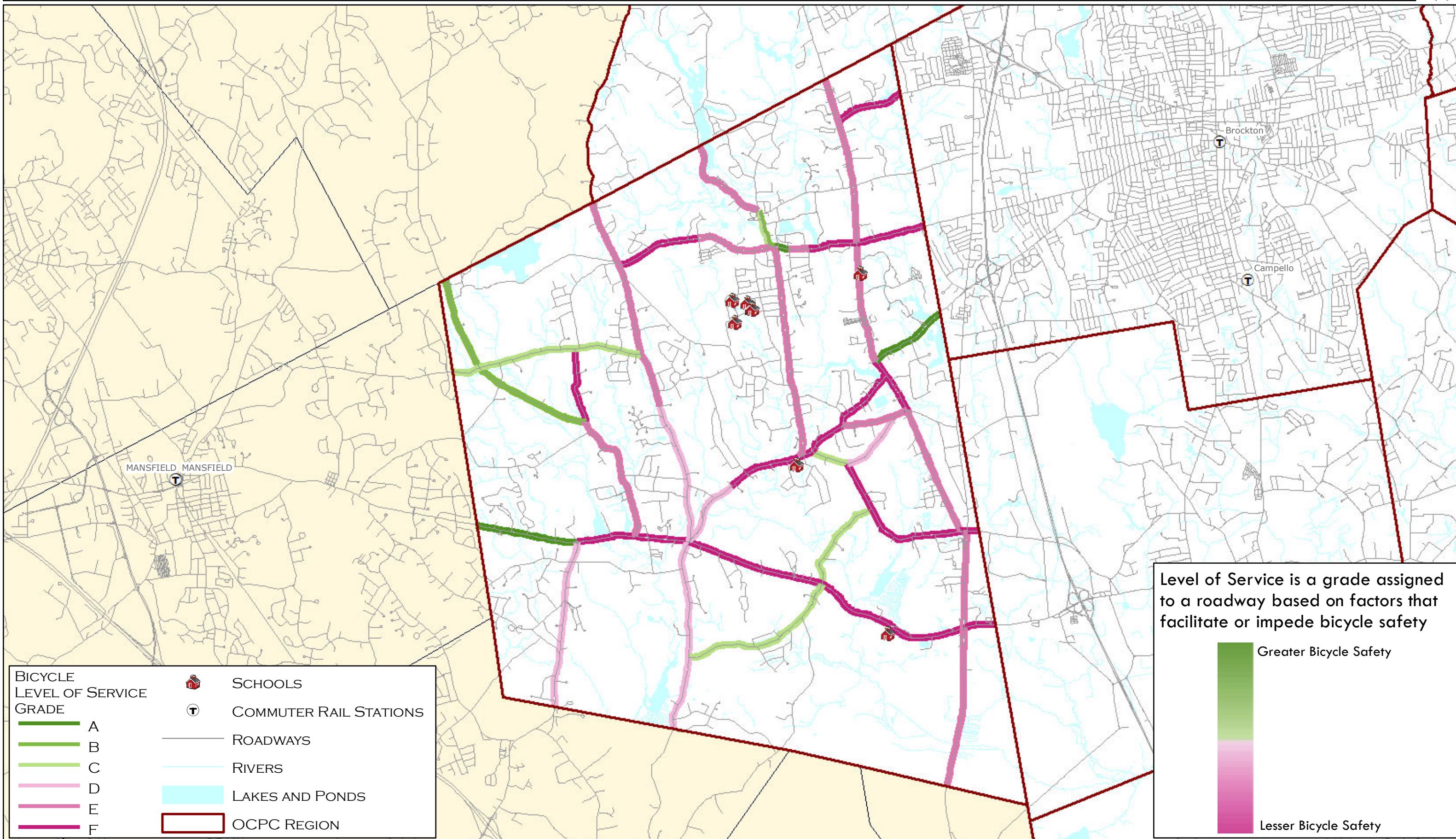
Install Bicycle Racks
at Town Hall



EASTON PEDESTRIAN LEVEL OF SERVICE



EASTON BICYCLE LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

Bicycle and Pedestrian Connectivity and Livability Study: Town of Easton

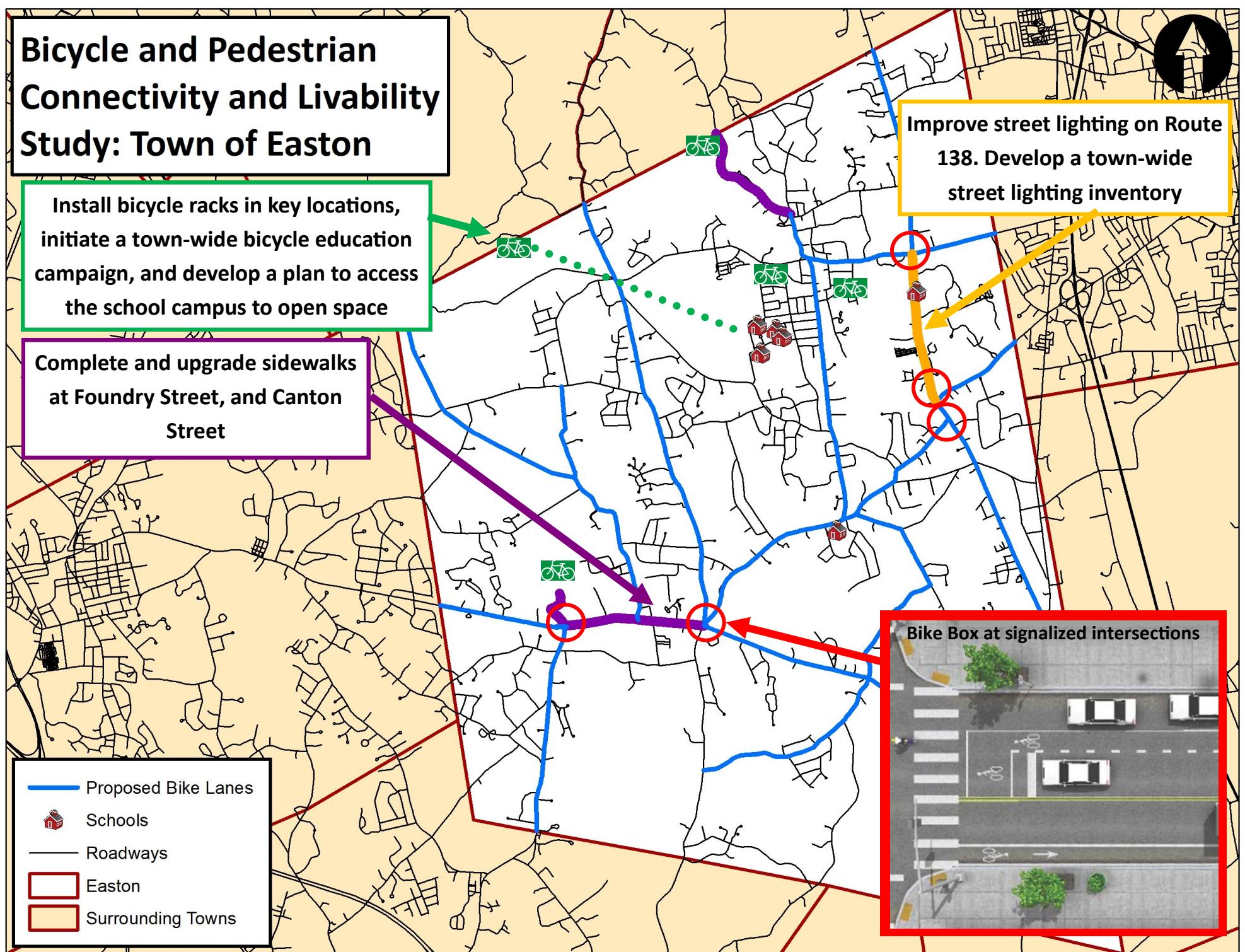
Install bicycle racks in key locations, initiate a town-wide bicycle education campaign, and develop a plan to access the school campus to open space

Complete and upgrade sidewalks at Foundry Street, and Canton Street

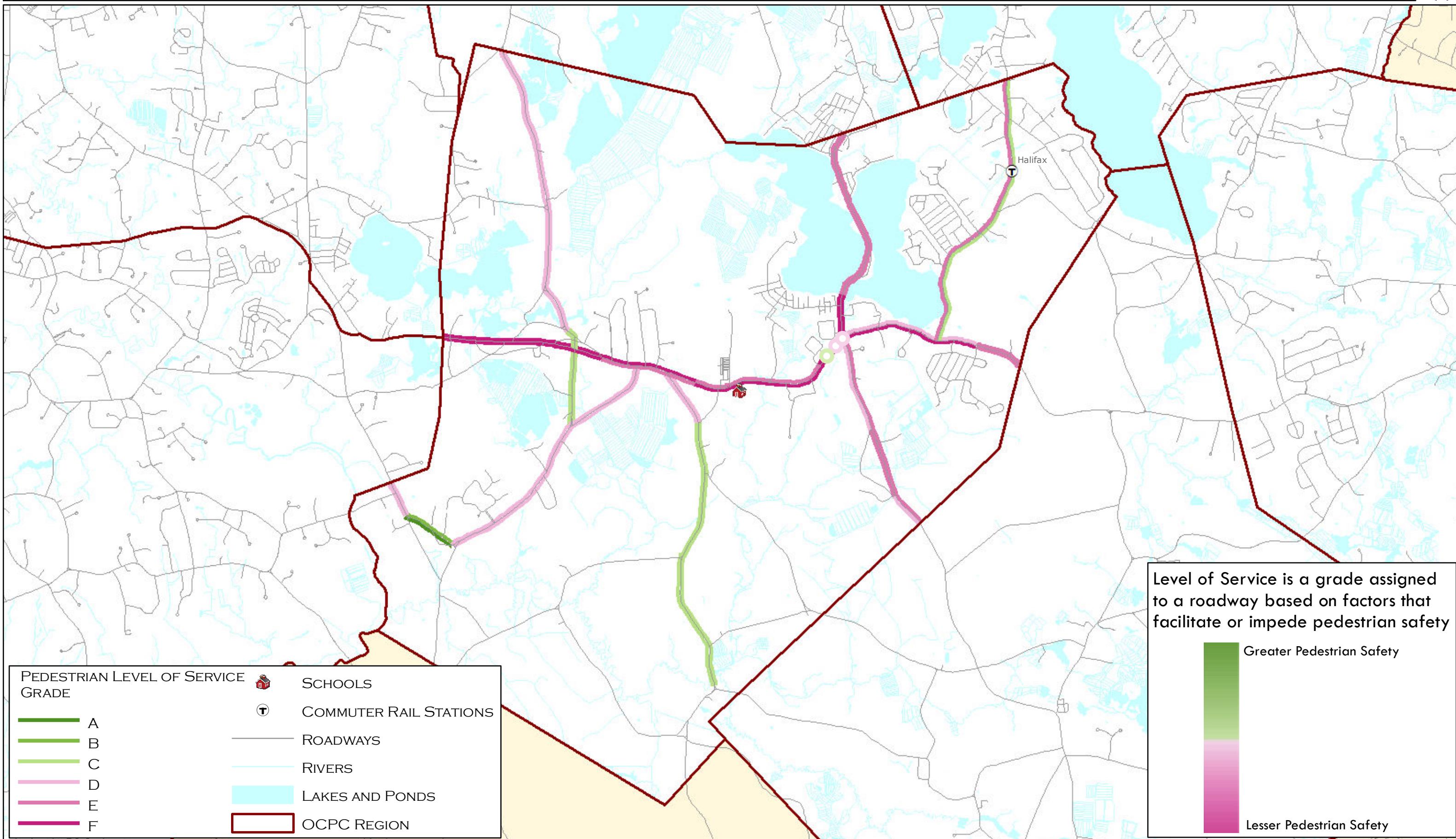
- Proposed Bike Lanes
- Schools
- Roadways
- Easton
- Surrounding Towns

Improve street lighting on Route 138. Develop a town-wide street lighting inventory

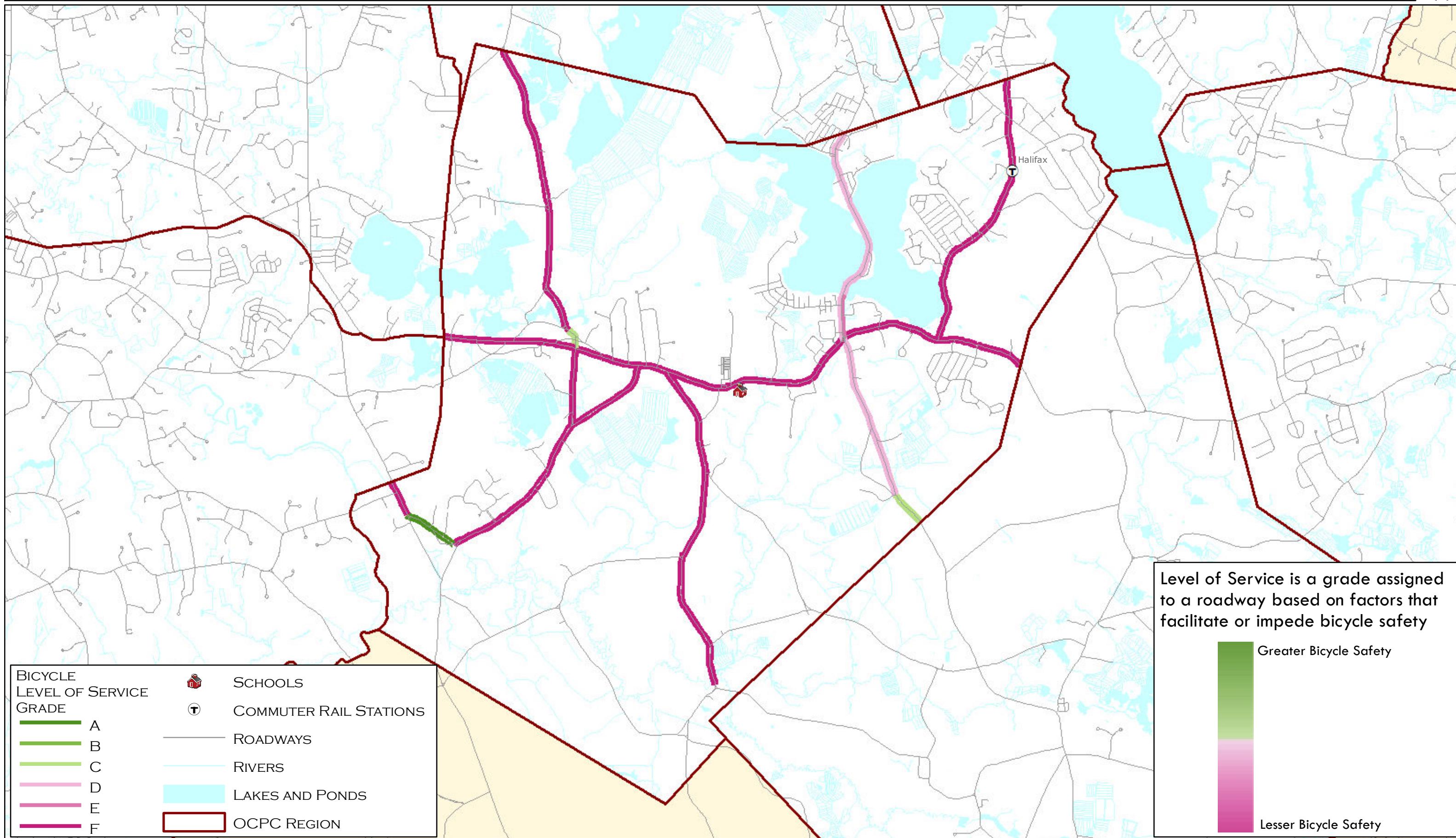
Bike Box at signalized intersections



HALIFAX PEDESTRIAN LEVEL OF SERVICE



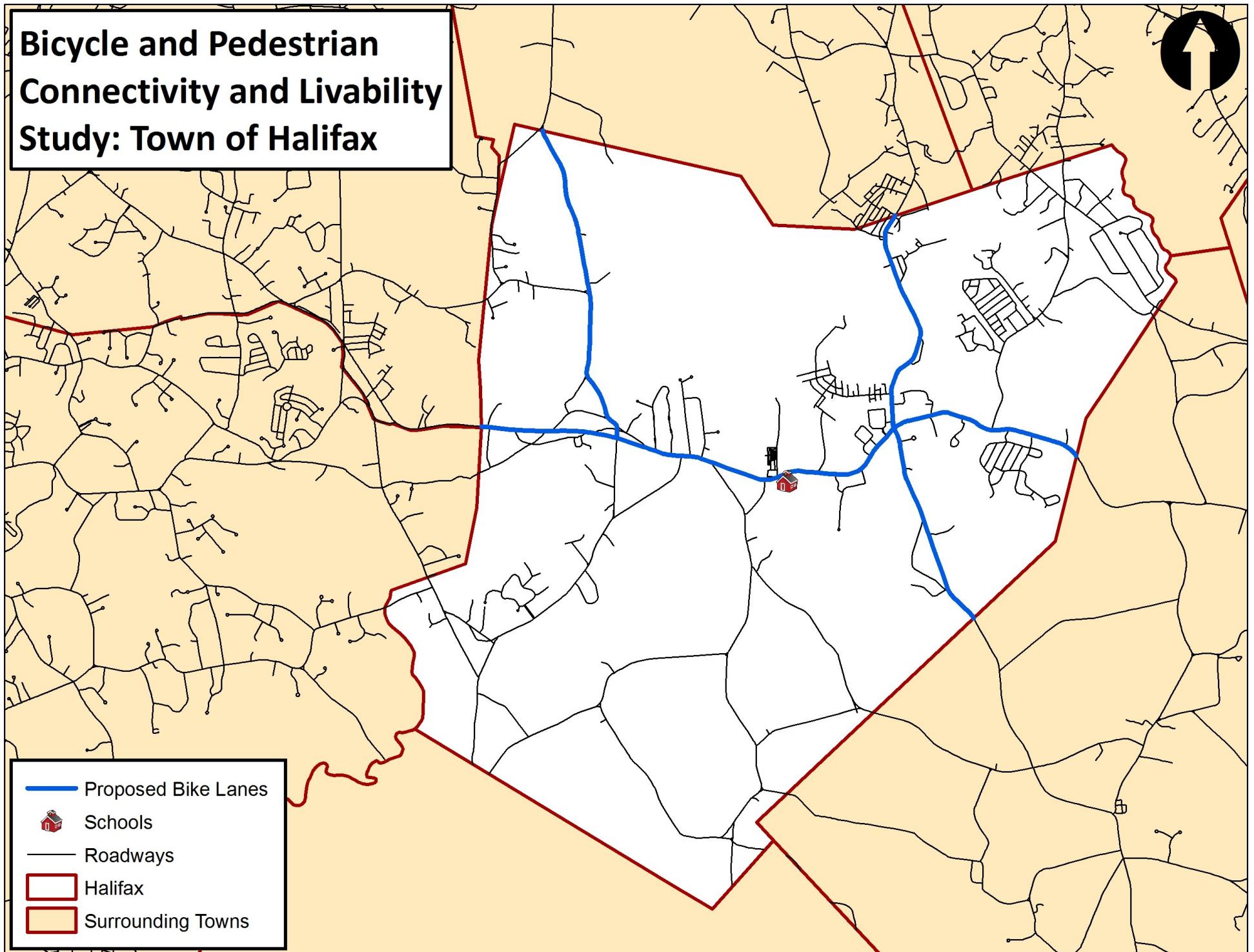
HALIFAX BICYCLE LEVEL OF SERVICE



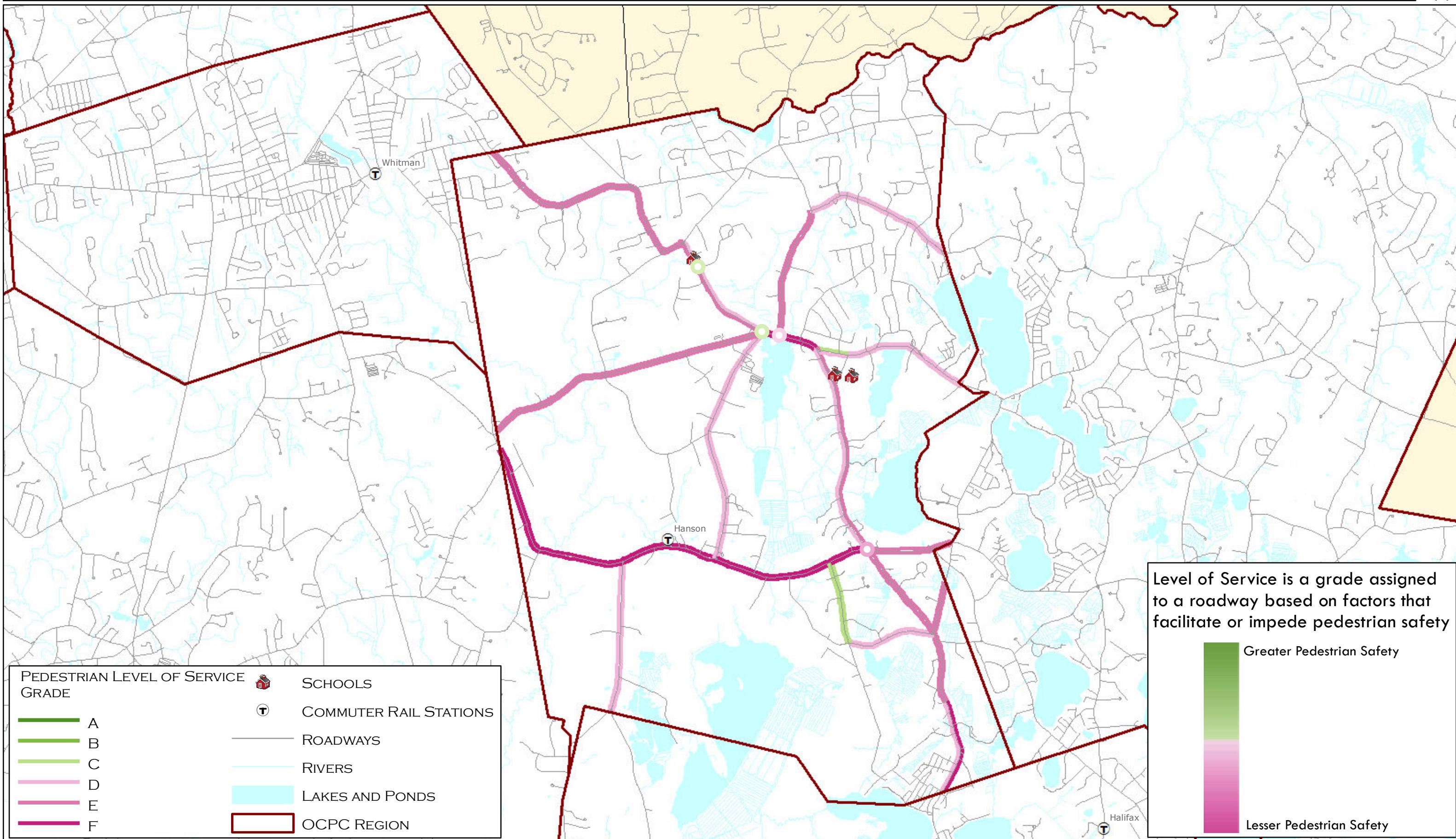
OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

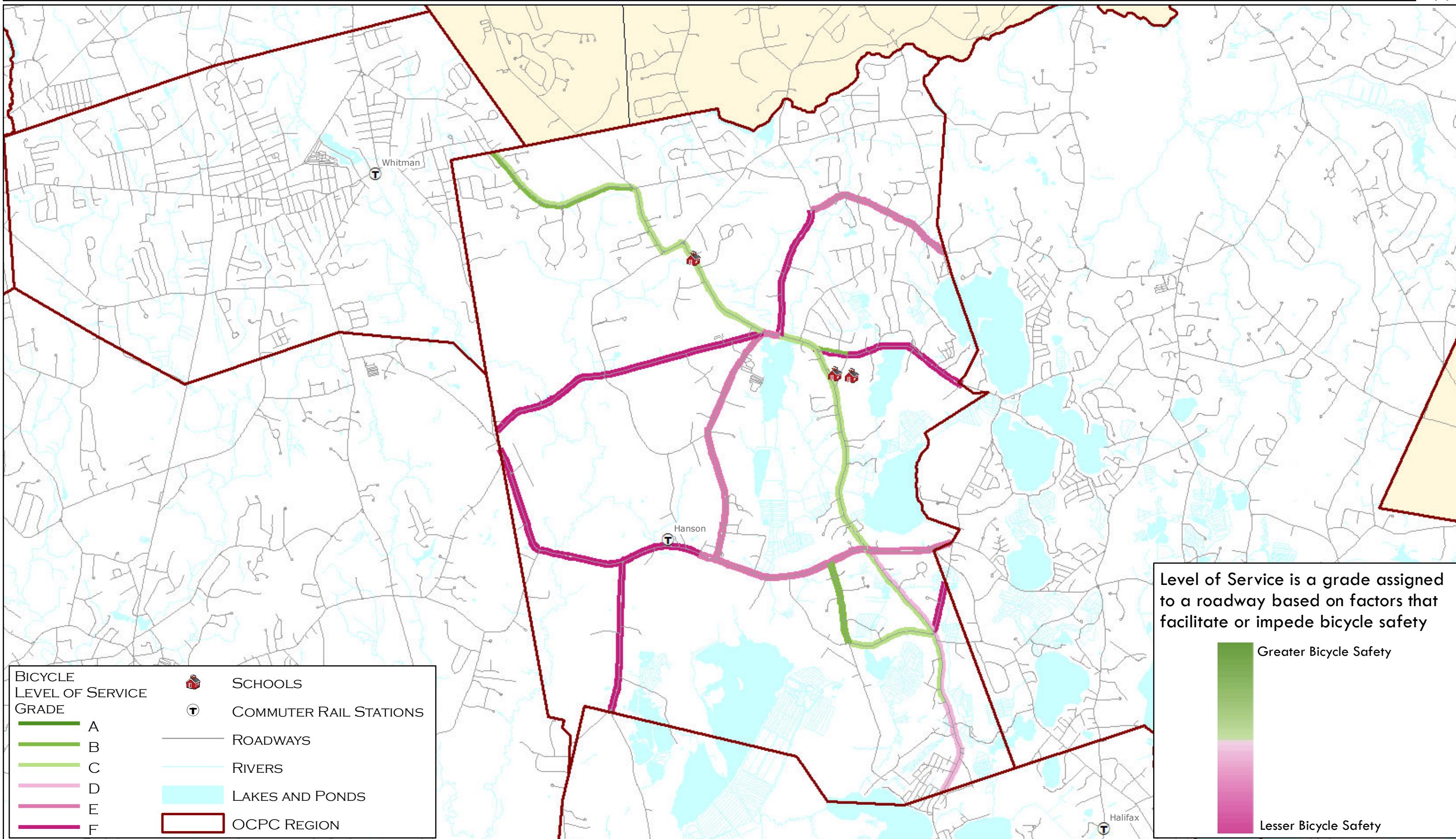
Bicycle and Pedestrian Connectivity and Livability Study: Town of Halifax



HANSON PEDESTRIAN LEVEL OF SERVICE



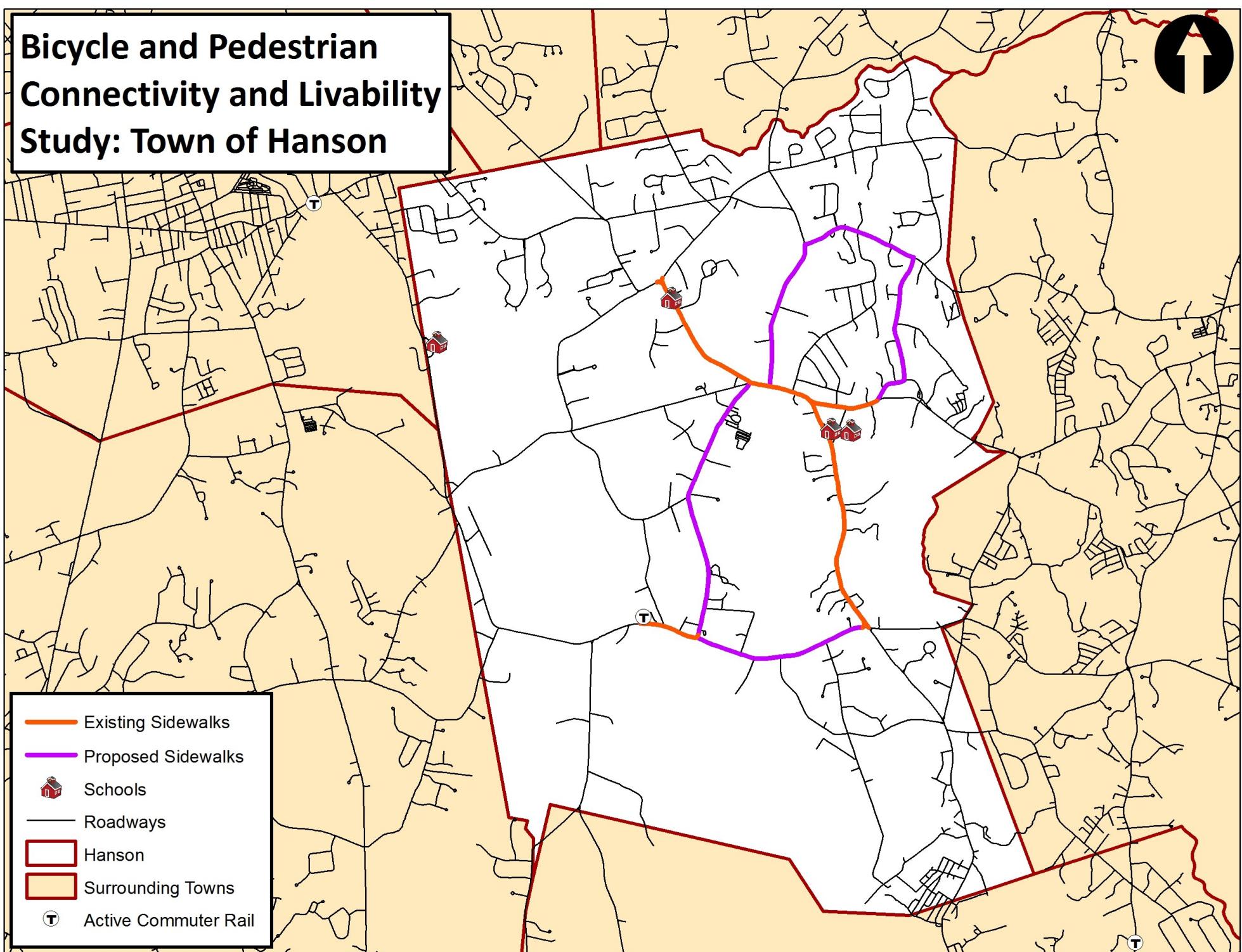
HANSON BICYCLE LEVEL OF SERVICE



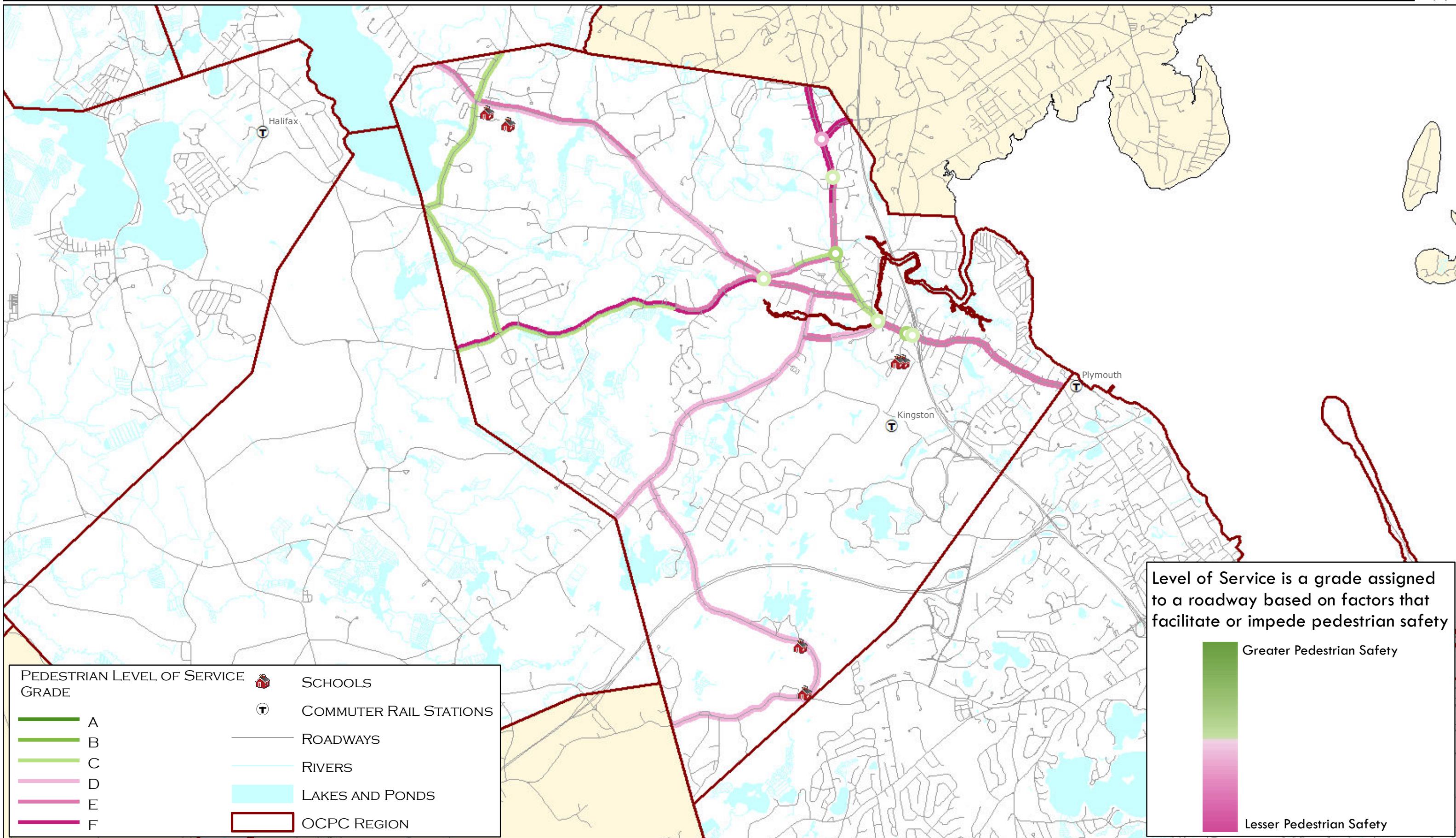
OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

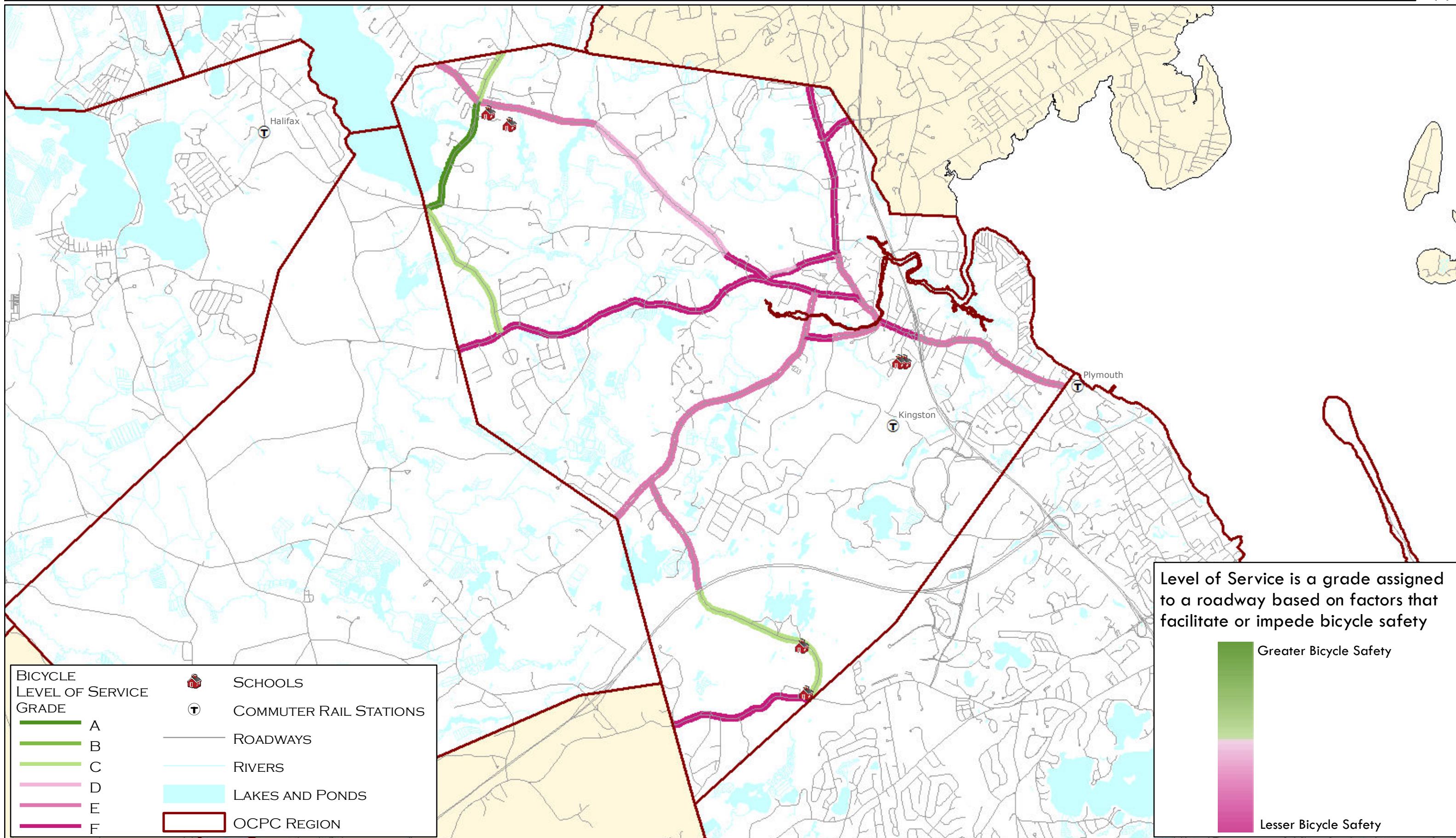
Bicycle and Pedestrian Connectivity and Livability Study: Town of Hanson



KINGSTON PEDESTRIAN LEVEL OF SERVICE



KINGSTON BICYCLE LEVEL OF SERVICE

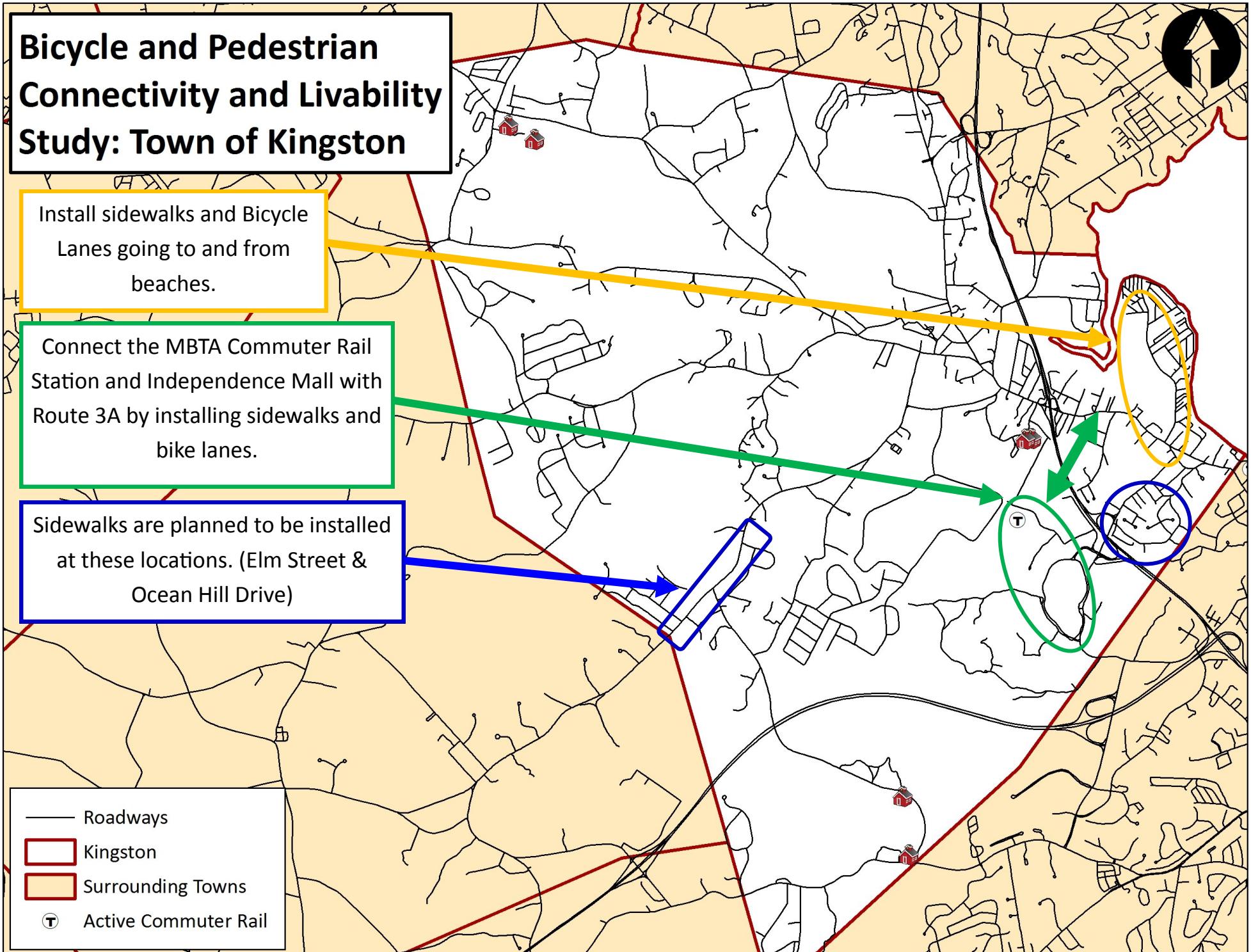


Bicycle and Pedestrian Connectivity and Livability Study: Town of Kingston

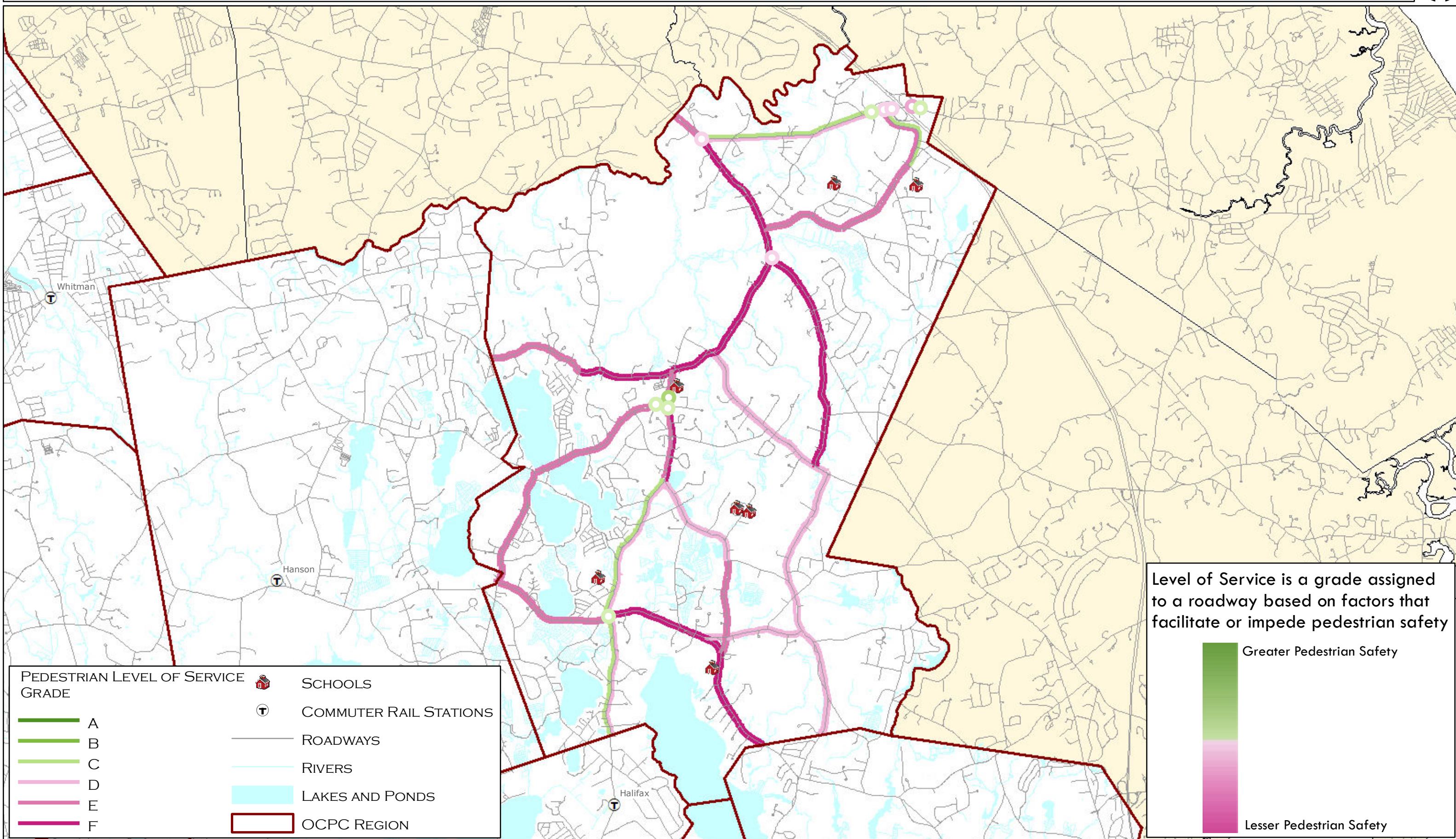
Install sidewalks and Bicycle Lanes going to and from beaches.

Connect the MBTA Commuter Rail Station and Independence Mall with Route 3A by installing sidewalks and bike lanes.

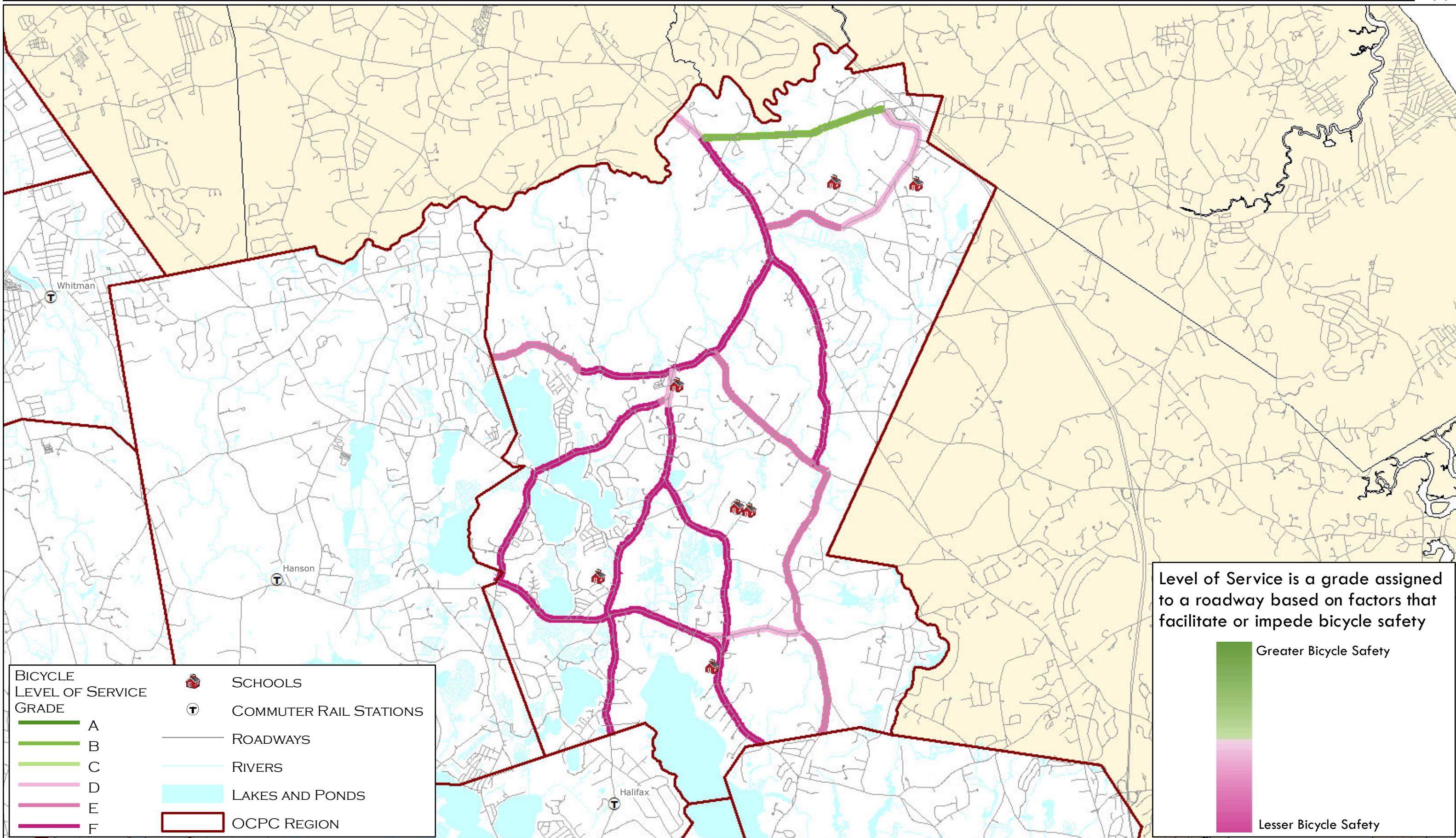
Sidewalks are planned to be installed at these locations. (Elm Street & Ocean Hill Drive)



PEMBROKE PEDESTRIAN LEVEL OF SERVICE



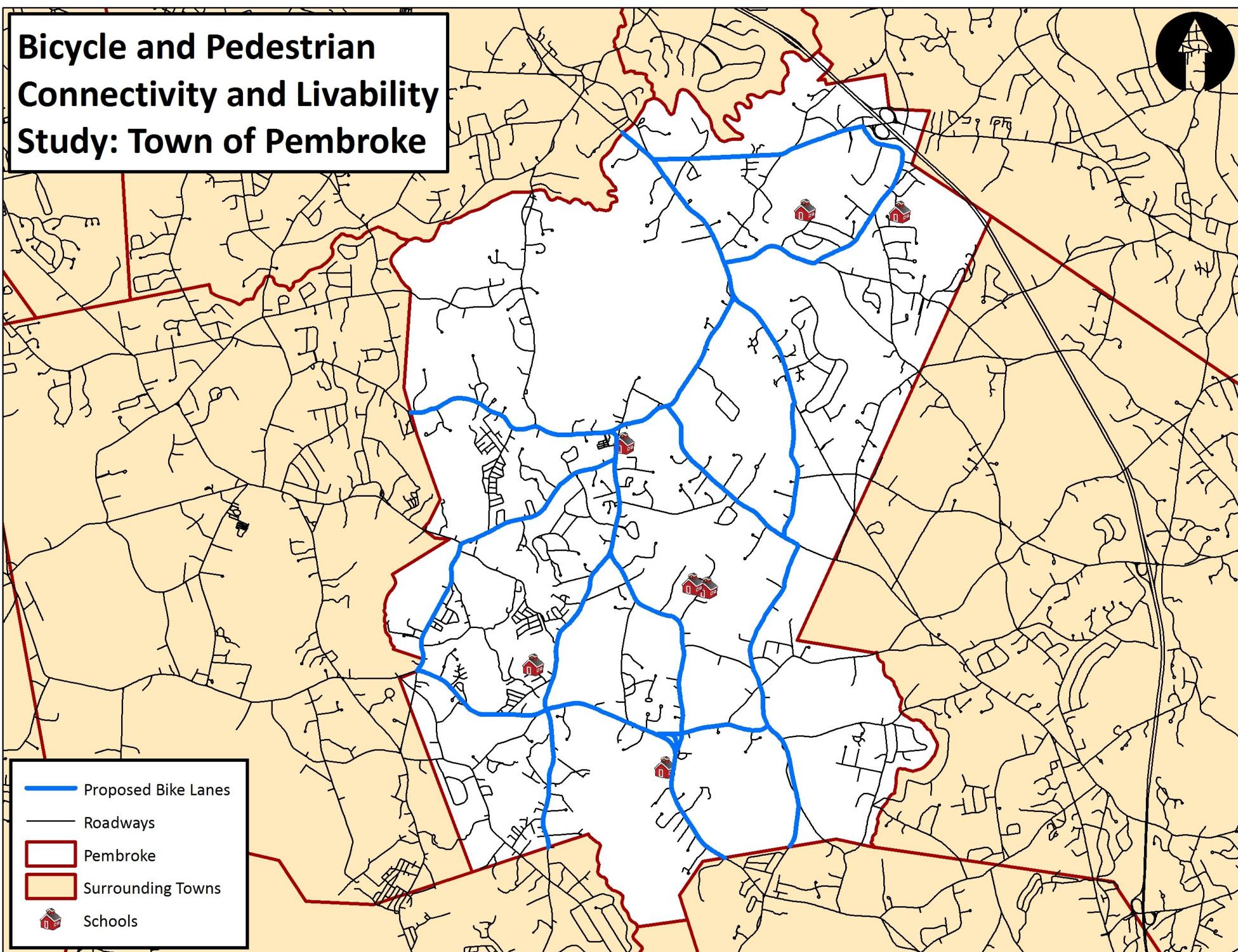
PEMBROKE BICYCLE LEVEL OF SERVICE



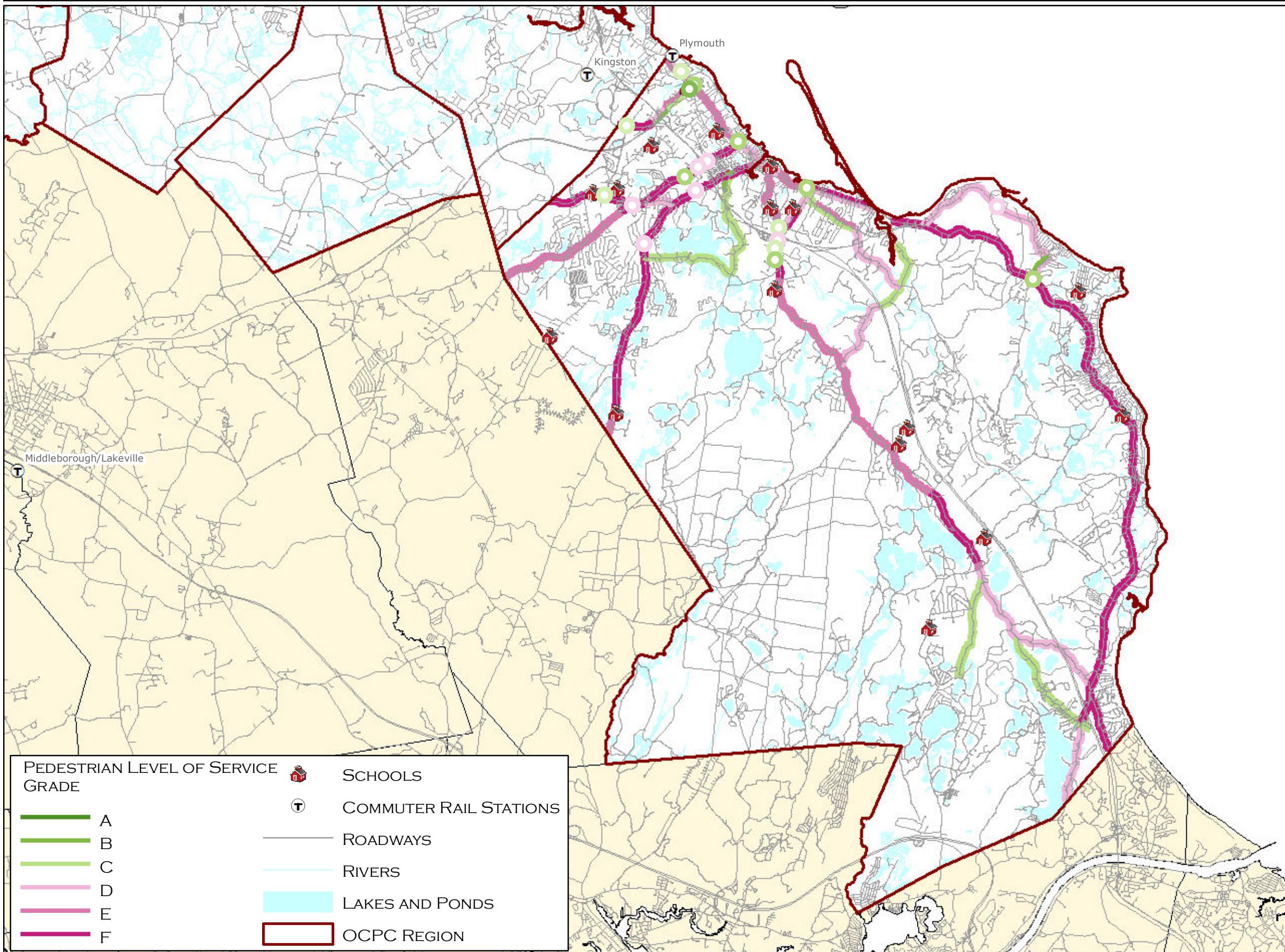
OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

Bicycle and Pedestrian Connectivity and Livability Study: Town of Pembroke



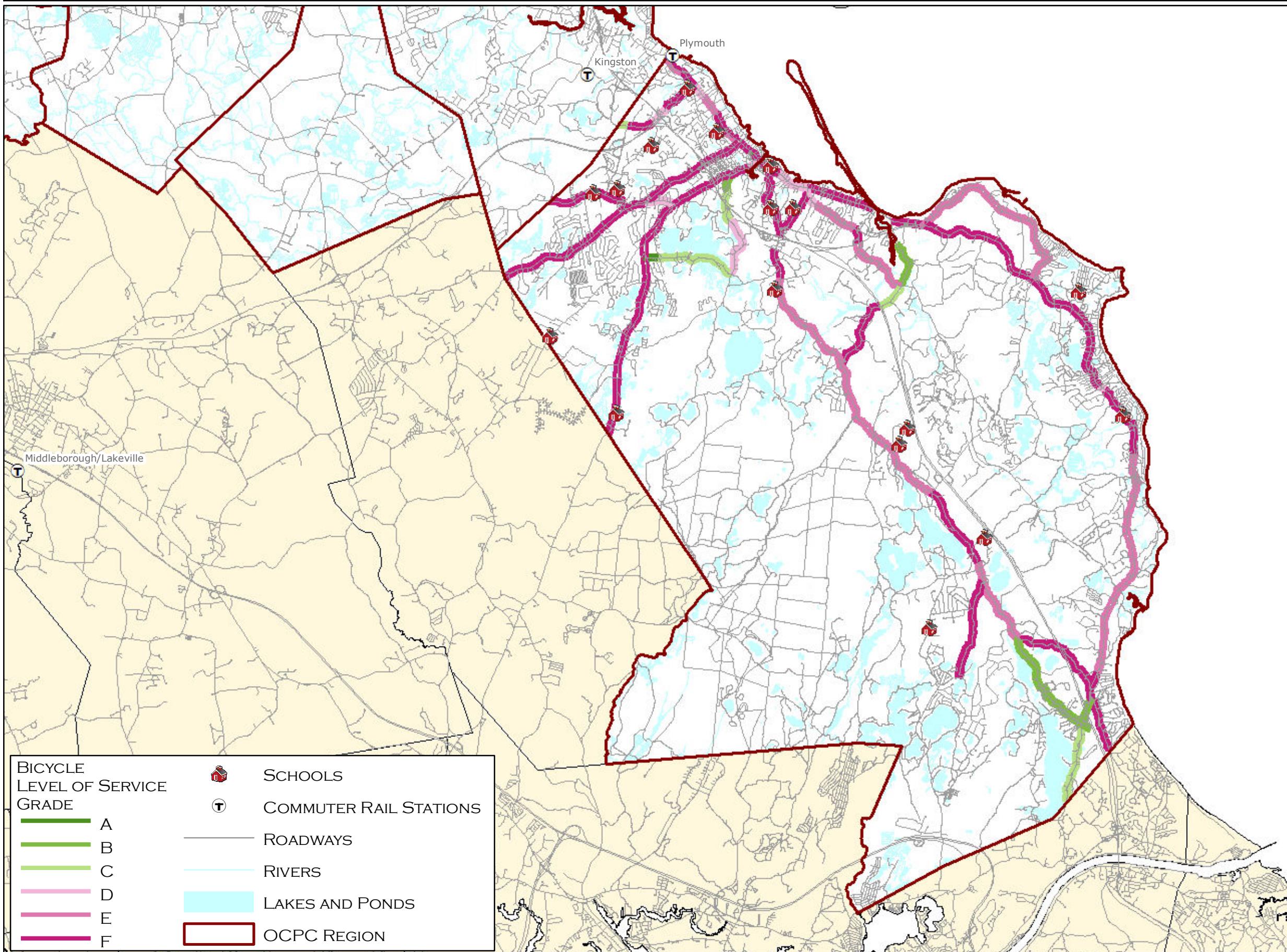
PLYMOUTH PEDESTRIAN LEVEL OF SERVICE



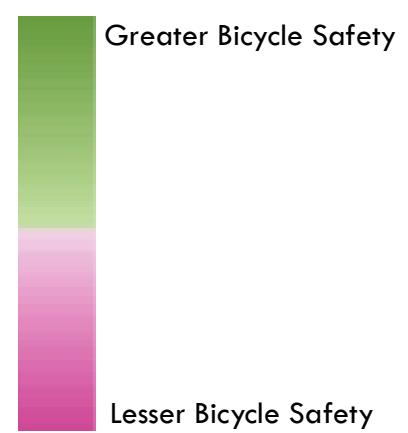
Level of Service is a grade assigned to a roadway based on factors that facilitate or impede pedestrian safety



PLYMOUTH BICYCLE LEVEL OF SERVICE



Level of Service is a grade assigned to a roadway based on factors that facilitate or impede bicycle safety



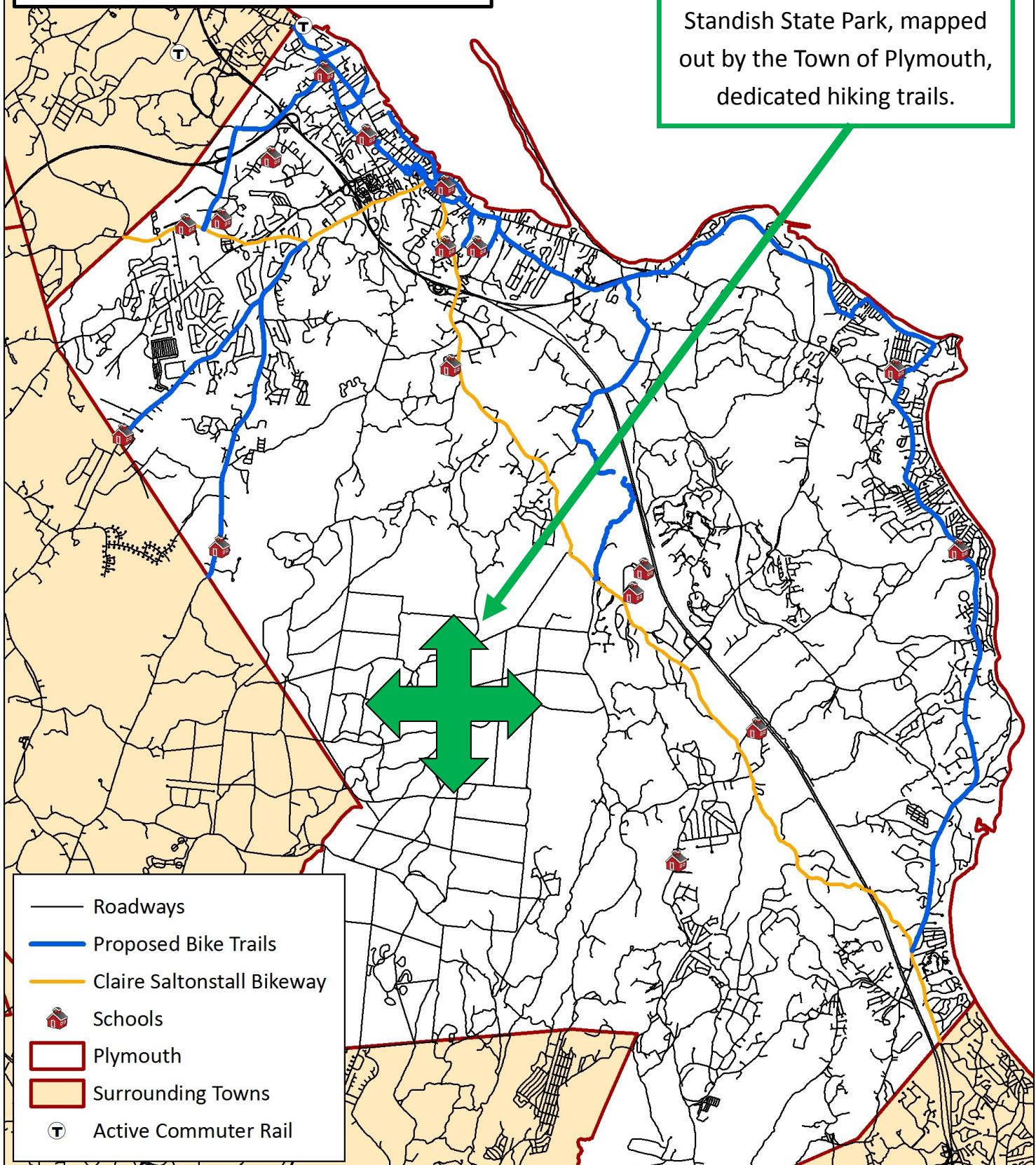
OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

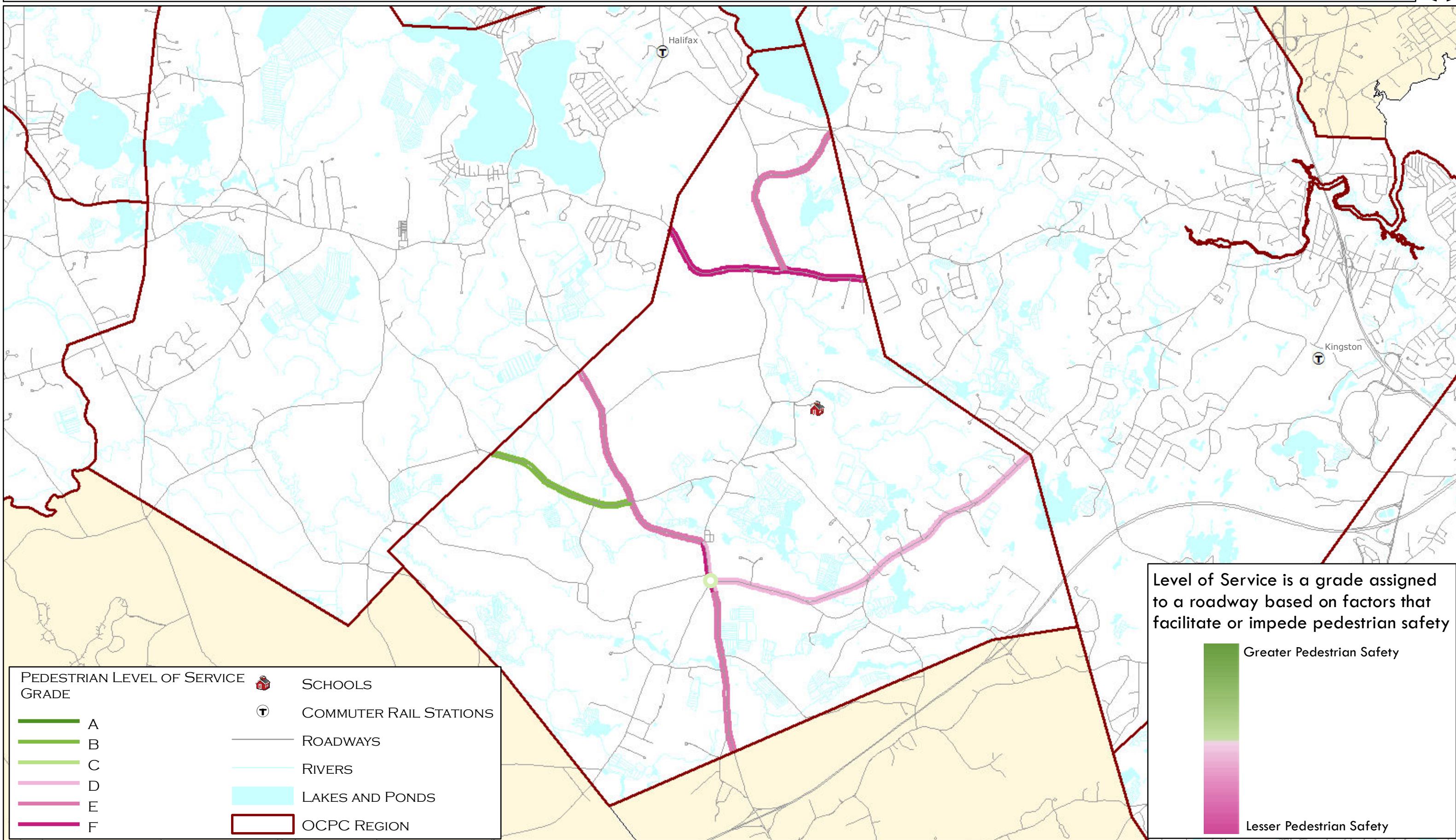
Bicycle and Pedestrian Connectivity and Livability Study: Town of Plymouth



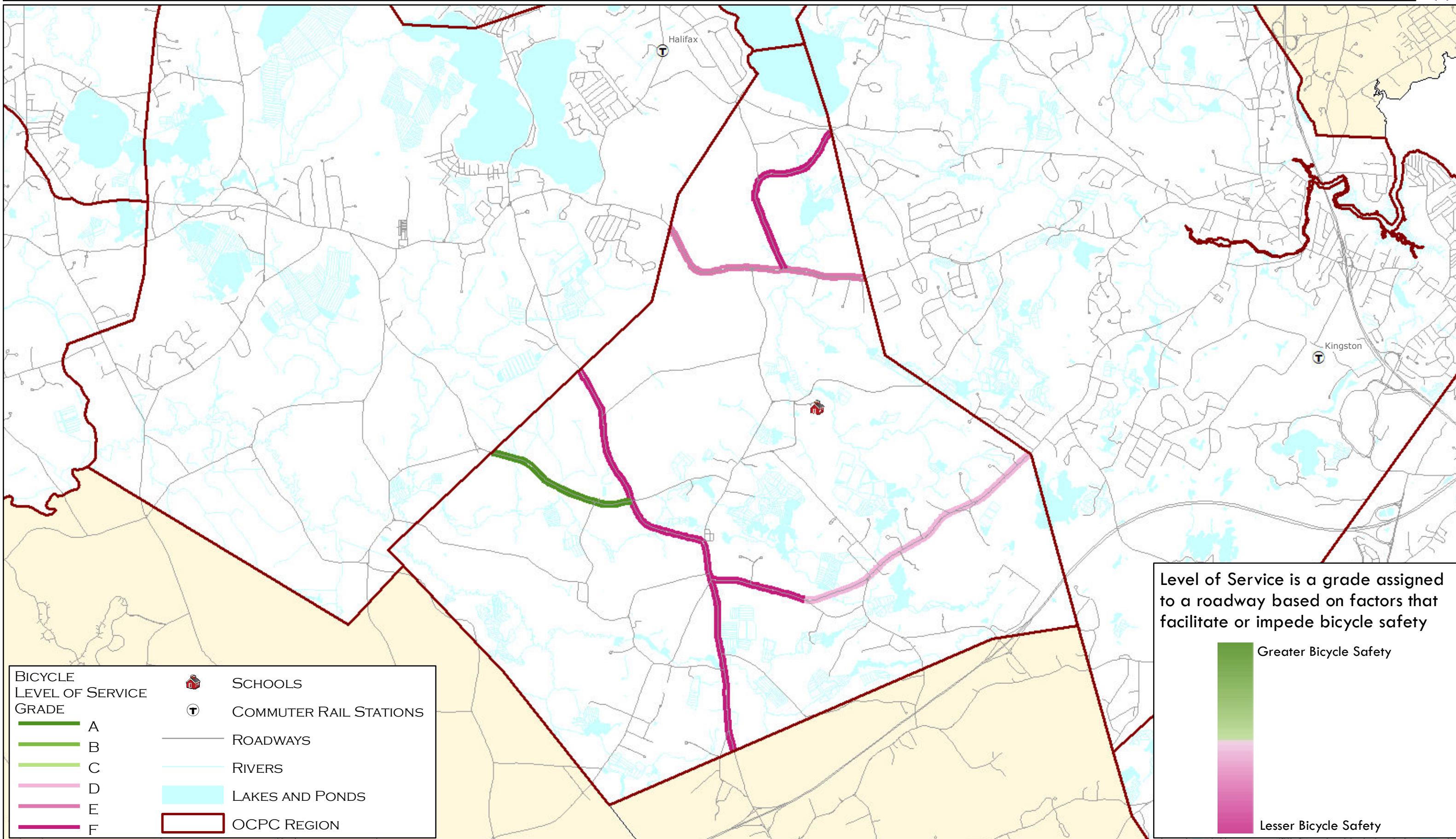
Establish trails through Myles Standish State Park, mapped out by the Town of Plymouth, dedicated hiking trails.



PLYMPTON PEDESTRIAN LEVEL OF SERVICE



PLYMPTON BICYCLE LEVEL OF SERVICE



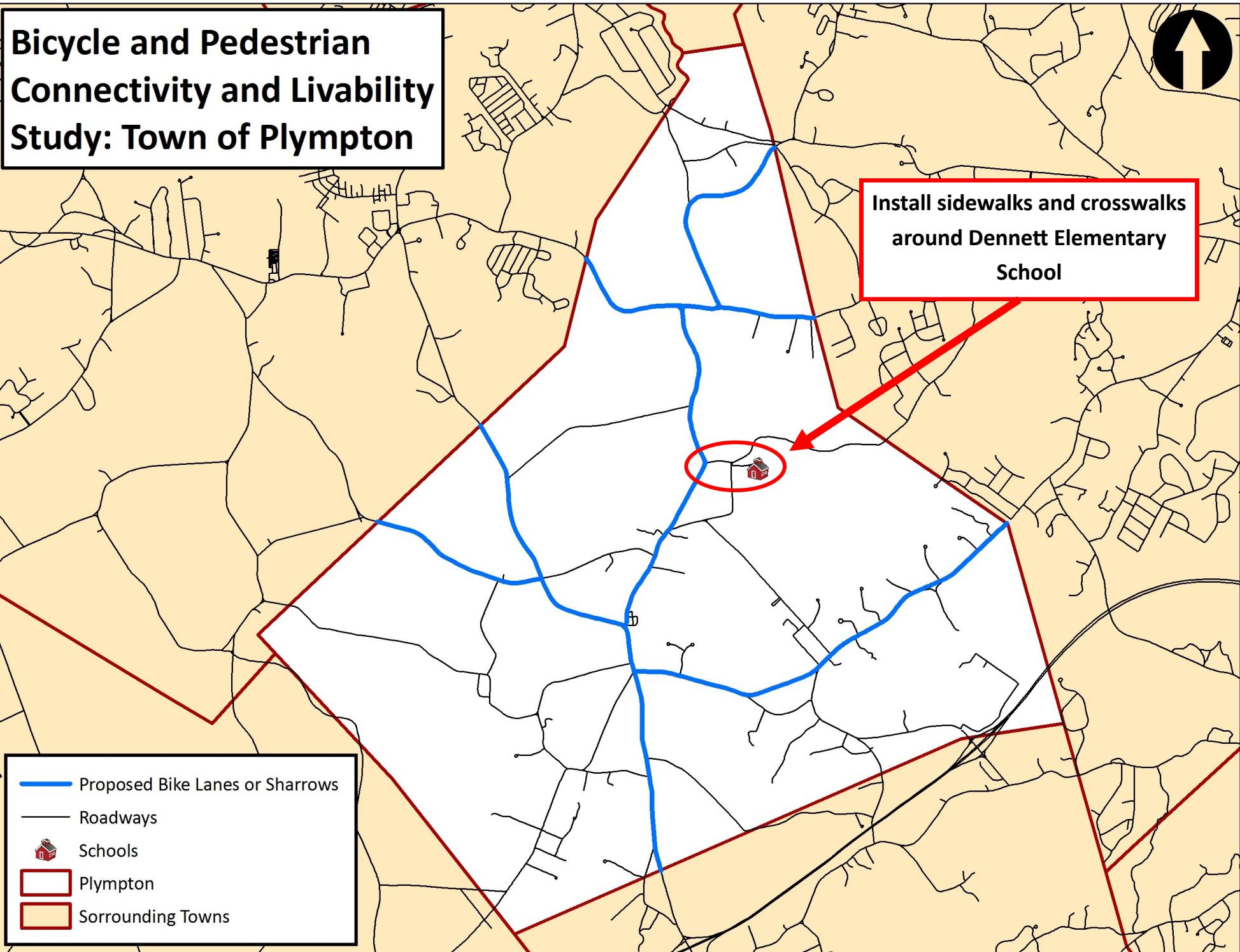
OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

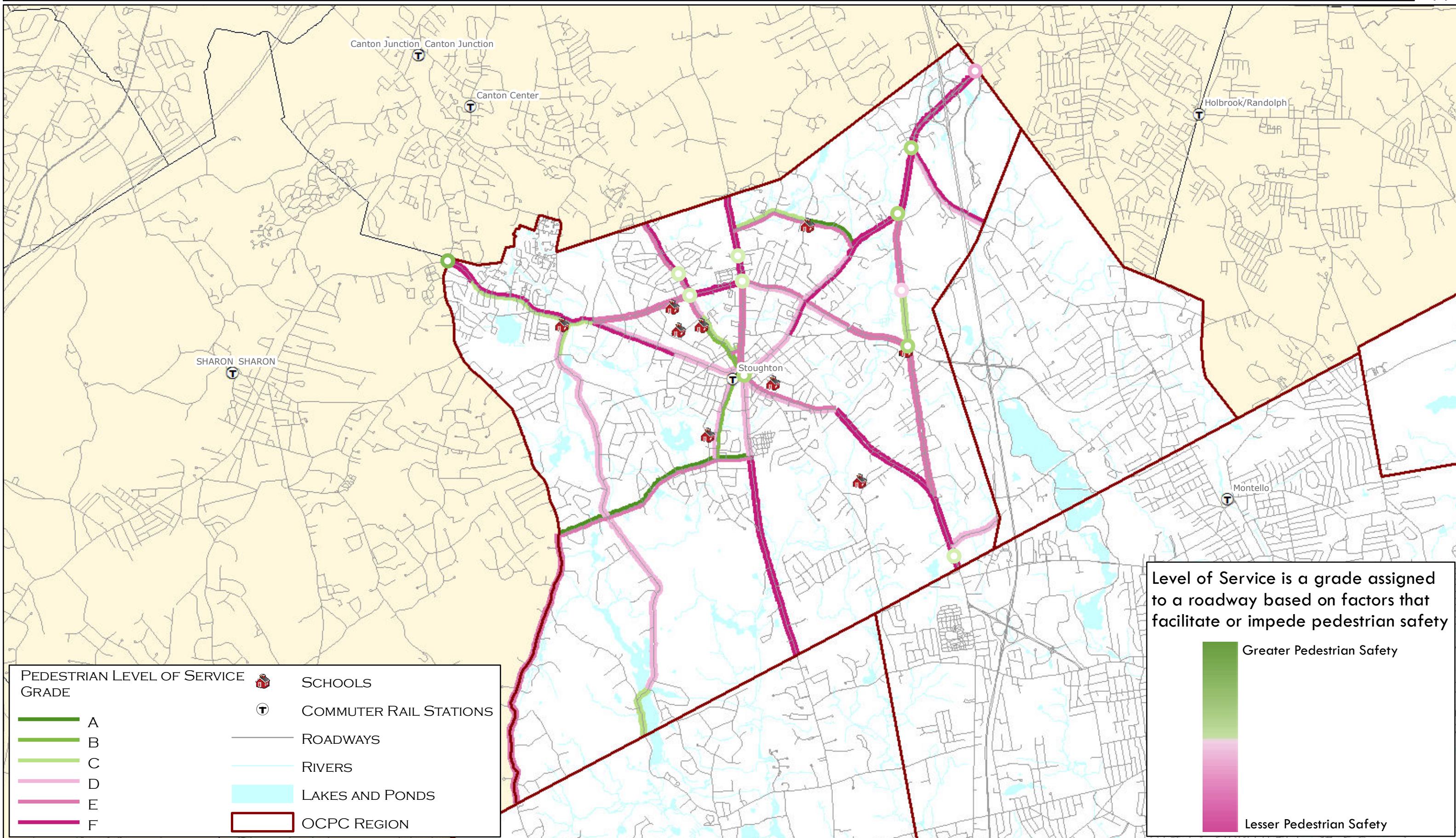
Bicycle and Pedestrian Connectivity and Livability Study: Town of Plympton



Install sidewalks and crosswalks
around Dennett Elementary
School



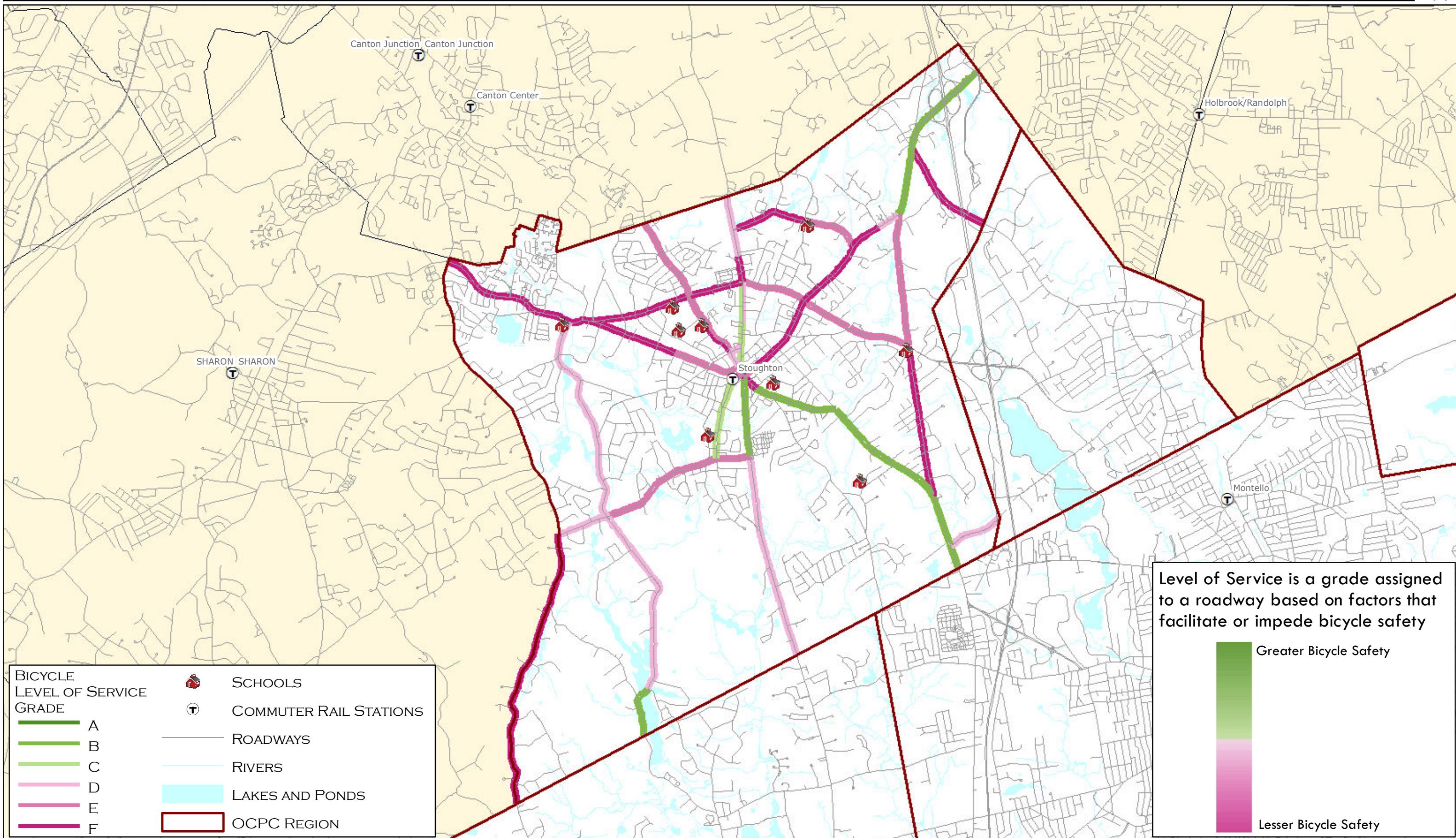
STOUGHTON PEDESTRIAN LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

STOUGHTON BICYCLE LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

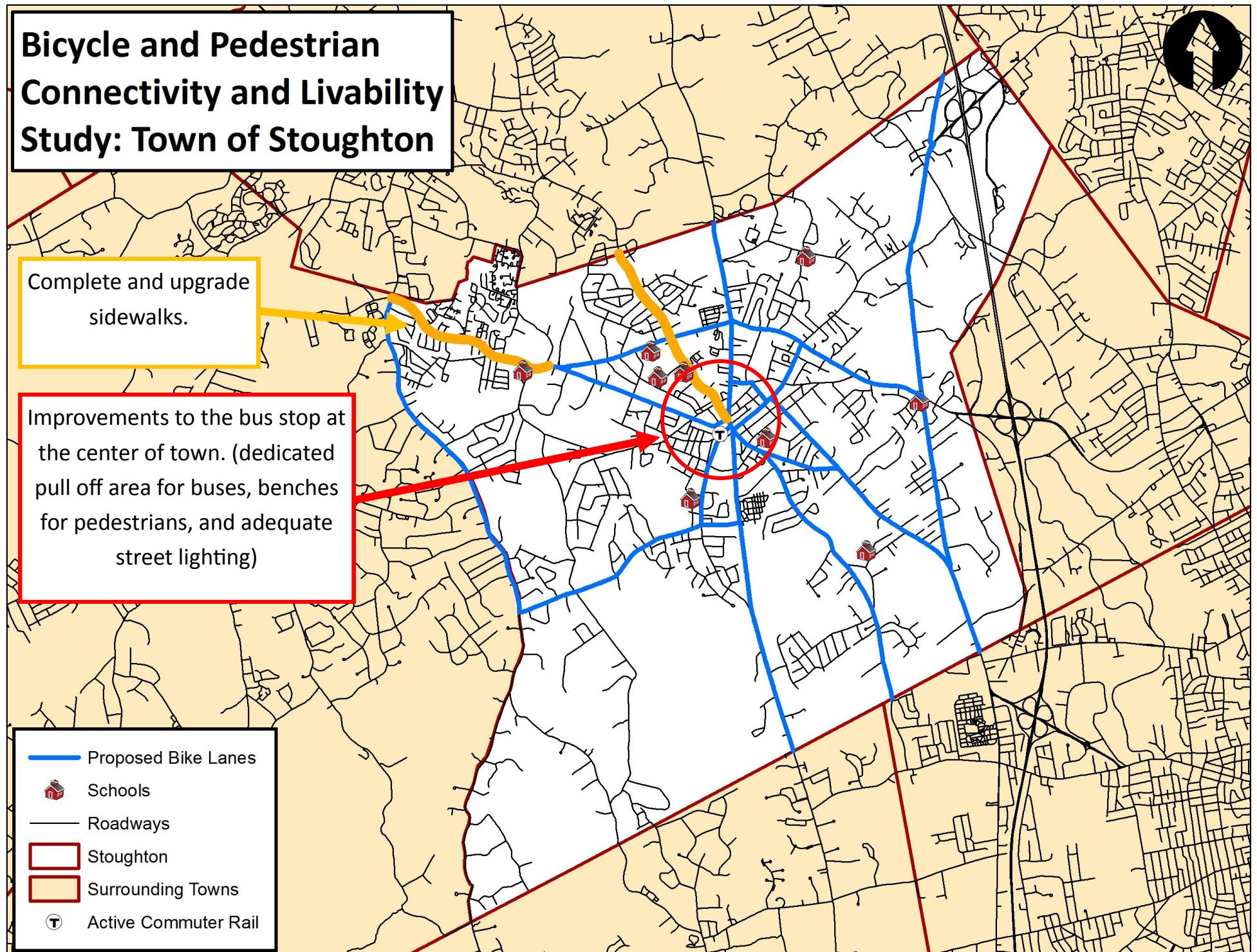
DECEMBER 2012

Bicycle and Pedestrian Connectivity and Livability Study: Town of Stoughton

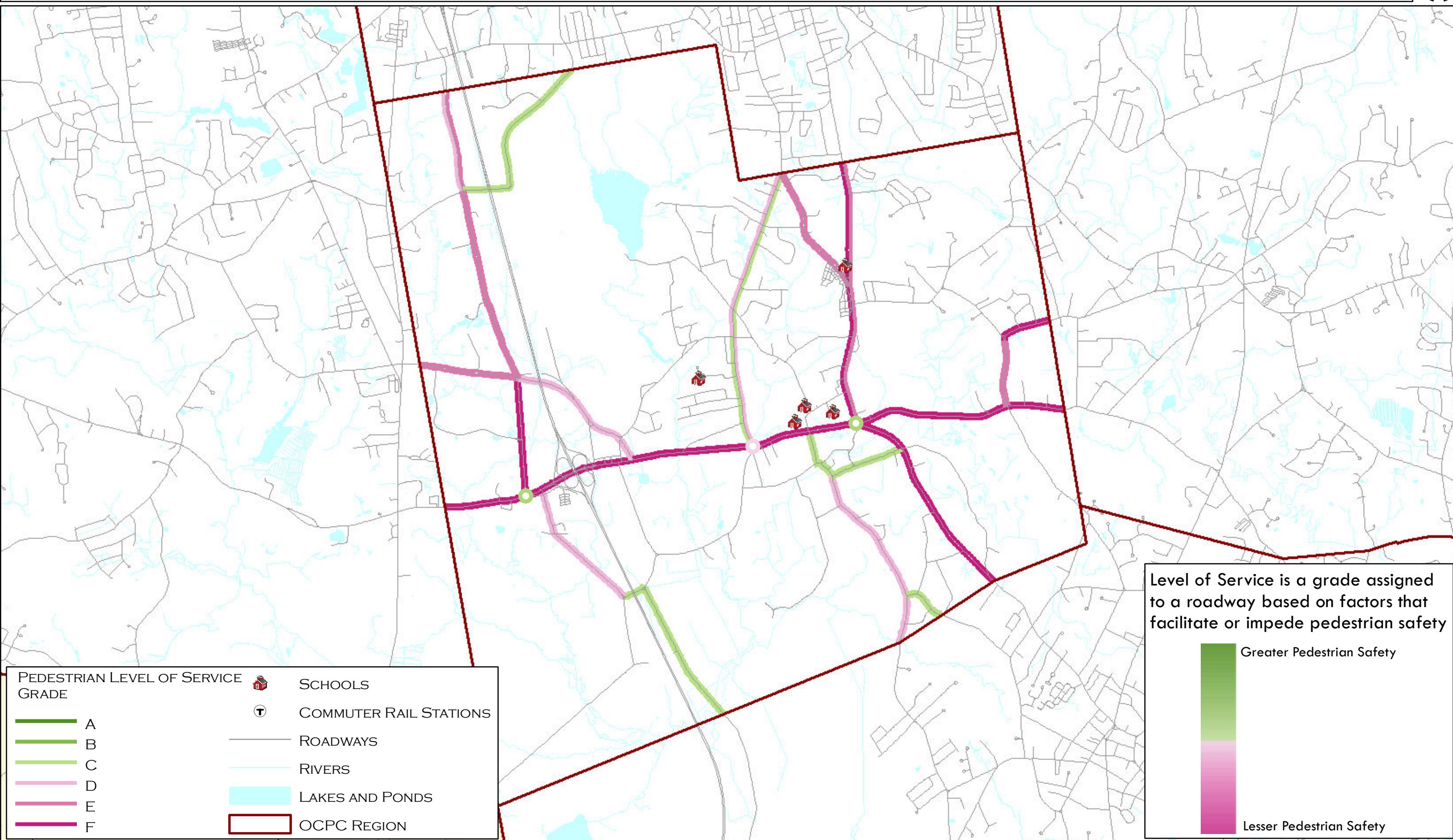
Complete and upgrade
sidewalks.

Improvements to the bus stop at
the center of town. (dedicated
pull off area for buses, benches
for pedestrians, and adequate
street lighting)

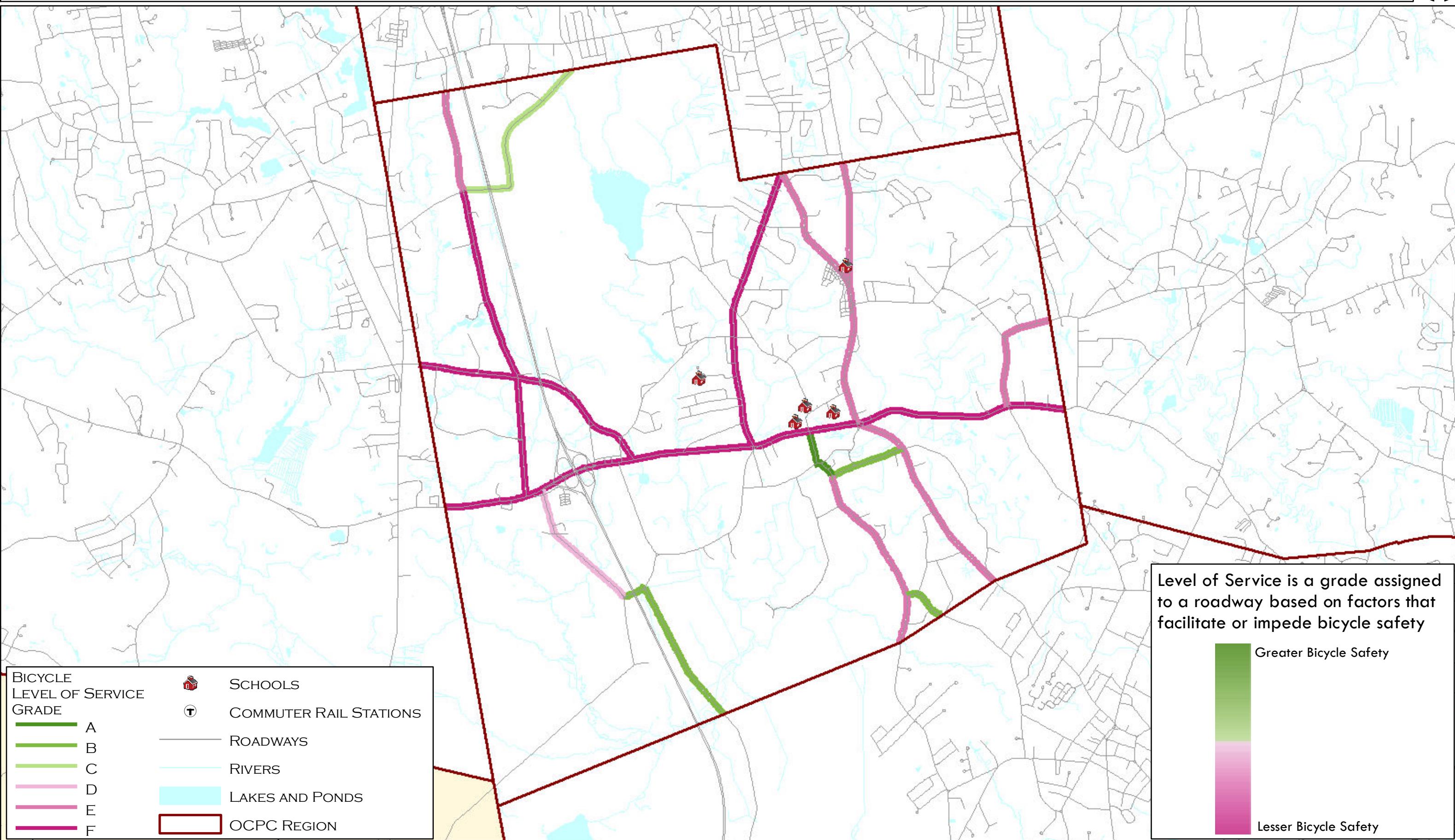
- Proposed Bike Lanes
- Schools
- Roadways
- Stoughton
- Surrounding Towns
- Active Commuter Rail



WEST BRIDGEWATER PEDESTRIAN LEVEL OF SERVICE



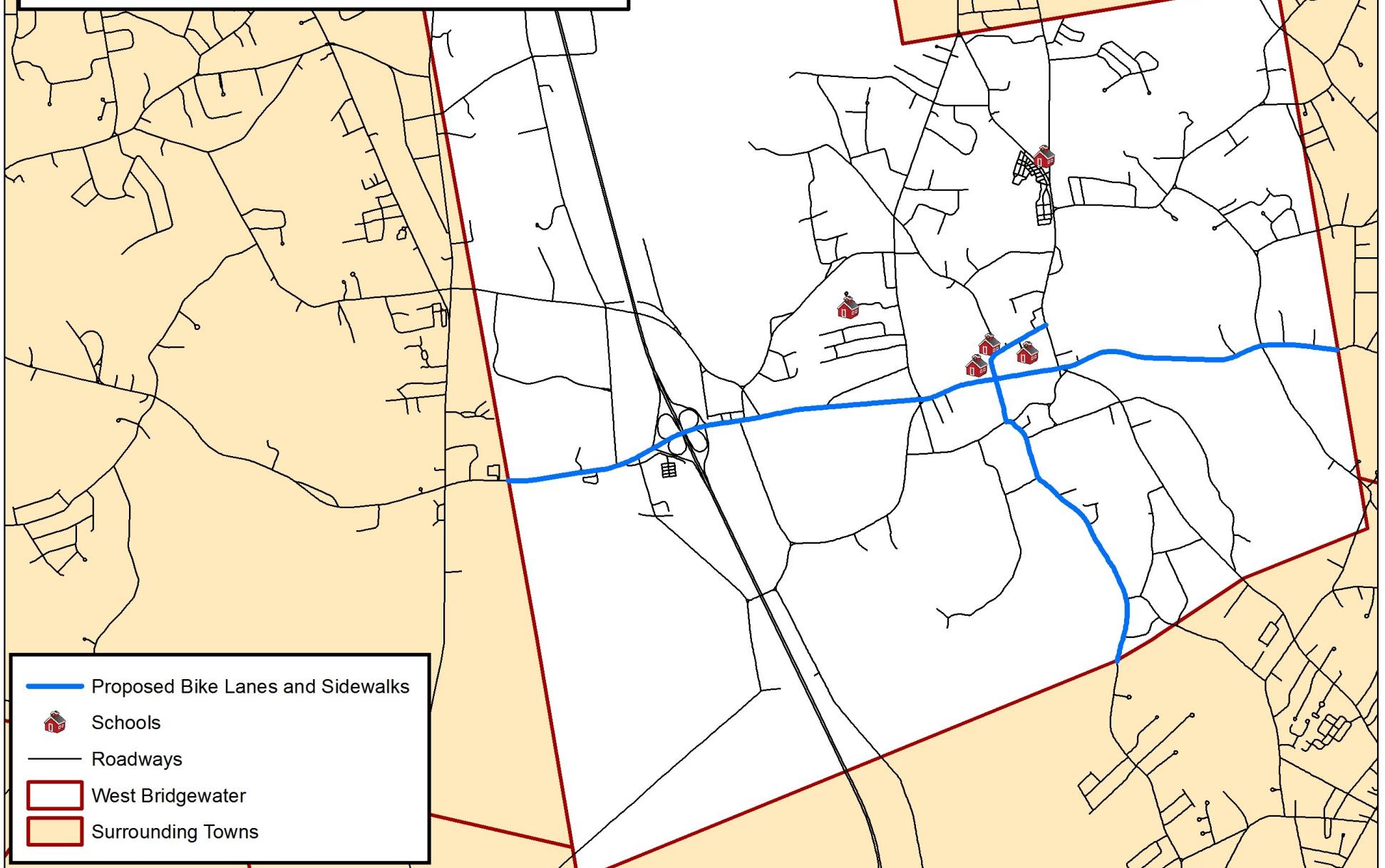
WEST BRIDGEWATER BICYCLE LEVEL OF SERVICE



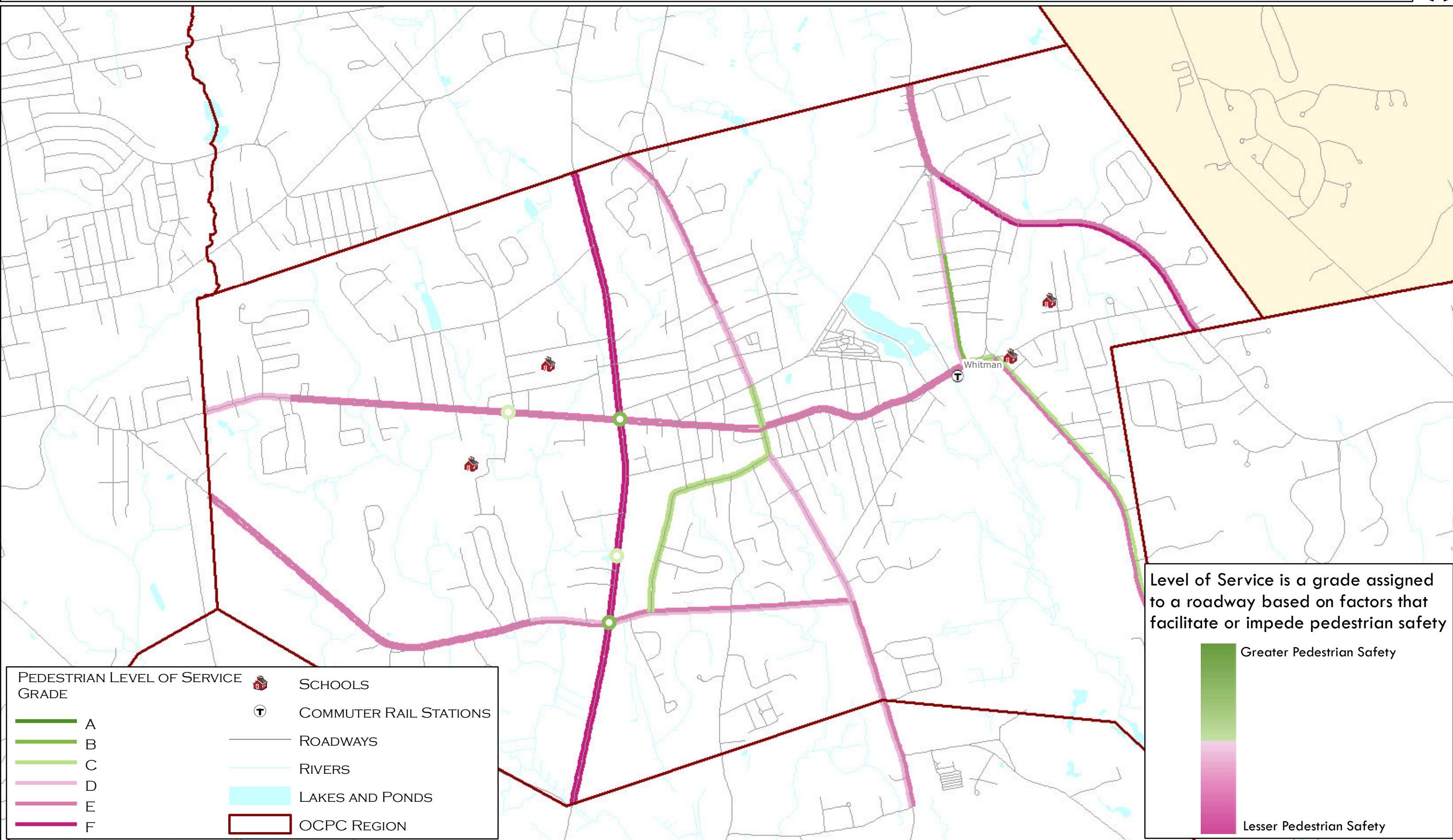
OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

Bicycle and Pedestrian Connectivity and Livability Study: Town of West Bridgewater



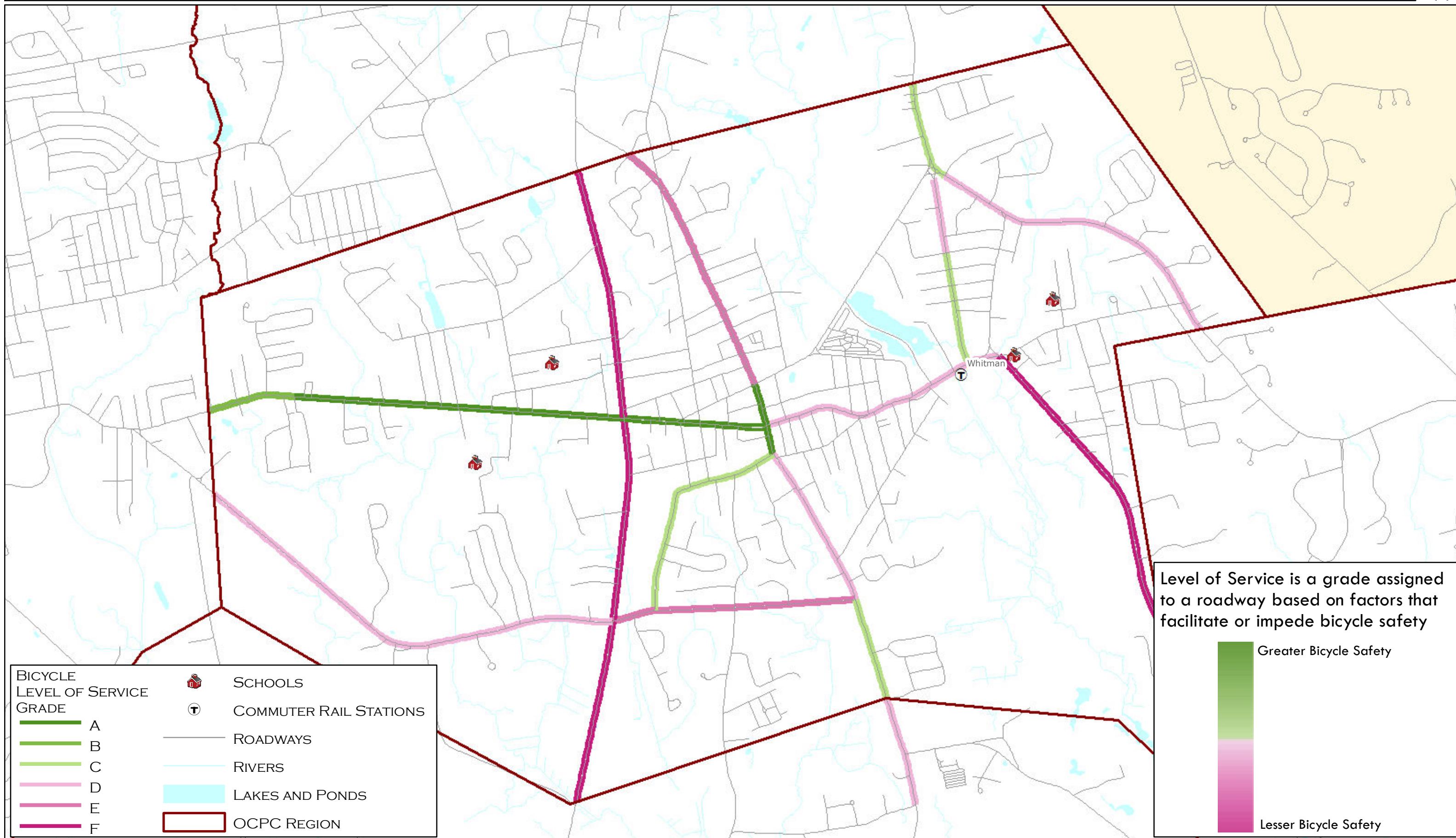
WHITMAN PEDESTRIAN LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

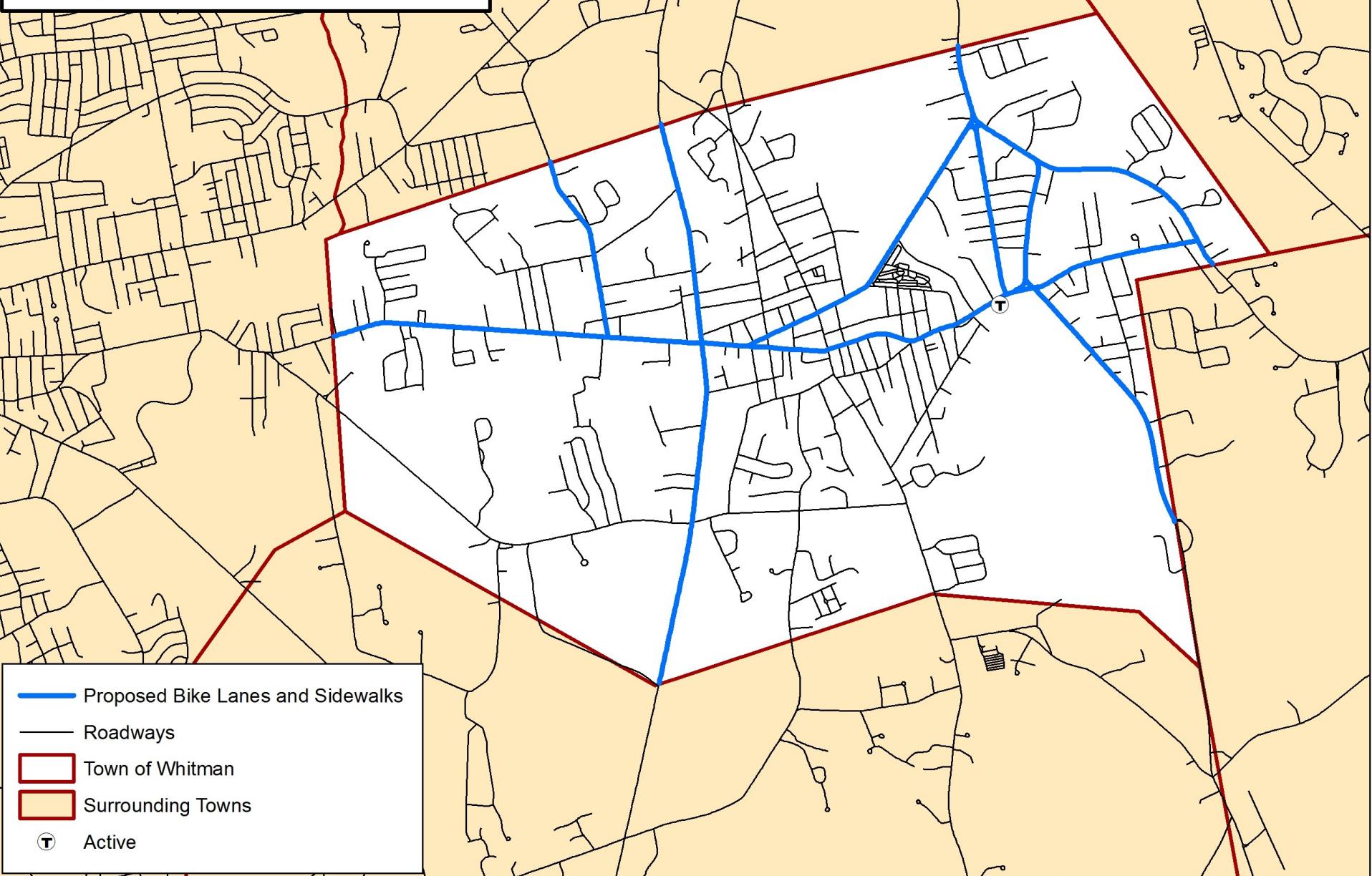
WHITMAN BICYCLE LEVEL OF SERVICE



OLD COLONY PLANNING COUNCIL, 70 SCHOOL STREET, BROCKTON, MA 02301
GIS DATA SOURCES: MASSGIS, MASSDOT, OCPC

DECEMBER 2012

Bicycle and Pedestrian Connectivity and Livability Study: Town of Whitman



Abington

In the Town of Abington, both bicycle and pedestrian improvements are needed to make the community more bicycle and pedestrian friendly. The area circled in red, on the Abington recommendations map, indicates an opportune area to install a multi-use trail (see **Figure 5**) to connect the eastern part of town to the western part of town. This major bicycle and pedestrian connector would run between Broadmeadow Lane to Lincoln Boulevard. The trail would connect both parts of town as well as the Abington Town Offices, High School, Town Library, and Ames Park.

Along Route 18, providing bicycle lanes both north and south would be a convenient way to connect northern and southern parts of town. In order to slow down traffic on Route 18, some traffic calming techniques would need to be implemented in order to make pedestrians and bicyclists safer. Branching off from Route 18, the bicycle and pedestrian network can connect with the proposed rail-to-trail project in Rockland, and the new South Weymouth Naval Air Base Redevelopment (Southfield). Bicycle and pedestrian connections should also be provided for the Green Street Residential Neighborhood (particularly to Route 123, and recreational areas). Bicycle parking facilities should be strategically placed along the bike network. Strategic places for bike parking would be at the end of the multi-use path and at key destinations in town.

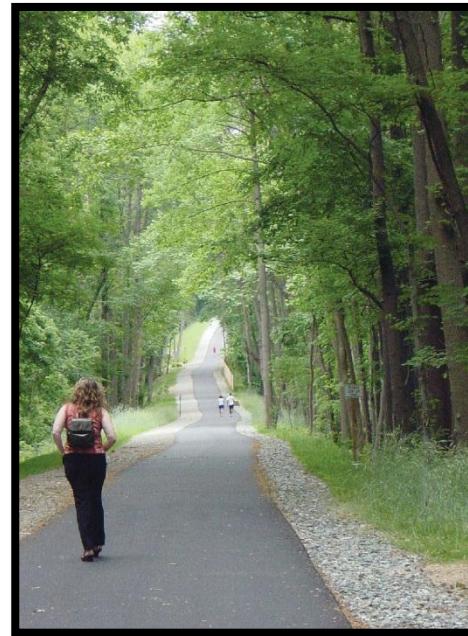


Figure 5: Example of Multi-Use Trail

Avon

For such a small town in area compared to all the others in the region, improvements for the Town of Avon are mainly focused on pedestrian connectivity. On some roadways, particularly East Main Street (Route 28), curbs need to be replaced and sidewalk repairs need to be made. Years of pavement overlaying have resulted in short and dangerous curb reveal on sidewalks (see **Figure 6**). The extension of sidewalks is also recommended from Page Street through Stoughton to Route 139. Also, sidewalks on East Main Street (Route 28) should be extended into Brockton.



Figure 6: Example of short curb reveal

The D.W. Field Park loop is a great destination for both pedestrians and bicyclists. Unfortunately, the pavement is currently in a state of disrepair. The pavement is deteriorating and vegetation is encroaching on the pathways. The town would also like to see a parking lot at the D.W. Park entrance off of Harrison Boulevard (opposite Pond Street). A lot of improper and illegal parking currently occurs there. A

parking lot in this location would allow for people to transport their bicycles to the park and bicycle the park loop.

Bridgewater

The Town of Bridgewater seeks bicycle lanes stretching throughout the entire town. The main hub of the bike lanes would start in the center of Bridgewater. Around this area, there are shops, restaurants/cafés, and schools. With the bicycle lanes branching off from the center of town, it allows the citizens of the town to travel very easily on a bike throughout the community. The bike lanes would also benefit the students and faculty of Bridgewater State University. Raynham and Middleborough are two towns not in the OCPC region that Bridgewater would like to connect with via bicycle lanes. Raynham lies to the west, while Middleborough lies to the south. The bicycle lane would connect to Raynham via Pleasant Street. The connection to Middleborough would be via Summer Street and Vernon Street. Cherry Street will be utilized for a bicycle lane to connect to Halifax.

Proposed Projects in Bridgewater

The intersection of Route 18 (Broad Street) at High Street will be undergoing signalization and geometric improvements. The project is expected to yield significant air quality and safety improvements at the intersection. The project is currently programmed in Year 2015 of the Old Colony TIP and has an estimated cost of \$2,208,400.

Brockton

The City of Brockton would like to see bicycle lanes throughout the City so they are connected to the surrounding towns (Avon, Abington, East Bridgewater, West Bridgewater, and Easton). The proposed bicycle lanes are illustrated in the map of Brockton following the Level of Service maps. The City of Brockton would be connected to Easton by way of Belmont Street (Route 123) and Torrey Street; the Town of West Bridgewater by Main Street (Route 28), Plain Street, Copeland Street; the Town of East Bridgewater by Thatcher Street; the Town of Whitman by Alger Street (Route 14); the Town of Abington by East Ashland Street; and the Town of Avon by North Main Street and the D.W. Field Park loop. Along with the recommended bicycle lanes, a city-wide bicycle education campaign should be initiated, and a bicycle map with key destinations should be developed.

The Old Colony Planning Council recommends that the City of Brockton create ADA compliant sidewalks, curb cuts, and crosswalks in areas near hospitals. **Figure 7** shows an example of ADA compliant curb cuts. There are three hospitals in Brockton that should have ADA compliant sidewalks, curb cuts, and crosswalks. The first hospital is the V.A. Hospital located off of Belmont Street. The Good Samaritan



Figure 7: ADA Compliant Curb Cuts

Medical Center is located off of Oak Street and North Pearl Street. The last location is Brockton Hospital located off of Centre Street (Route 123). Along with the addition of ADA compliant sidewalks at hospitals, sidewalks at Summer Street, Torrey Street, and Belmont Street should also be completed and/or upgraded.

There are three Commuter Rail Stations in the City of Brockton; Campello Station, Brockton Station, and Montello Station. At all three of these locations it is recommended that crosswalks receive an upgrade to include the installation of direct walkways and pedestrian safety gates. These pedestrian connection improvements at the commuter rail stations will make it safer for pedestrians traveling to and from the station.

Proposed Projects in Brockton

The West Elm Street reconstruction project will reconstruct a 1.1 mile section of West Elm Street from West Street to Warren Avenue. Included in this project is the reconstruction of the intersection of West Elm Street at Ash Street. The intersection is currently STOP sign controlled on the Ash Street (northbound and southbound) approaches, and is ranked as #3 on the Old Colony Top 100 Most Hazardous Intersections. The project includes the installation of traffic signals and geometric improvements. Total project cost for the West Elm Street Reconstruction Project is \$4,289,155, and it is estimated that the improvements to the West Elm Street at Ash Street intersection will account for approximately \$1,500,000 of the total project cost. The project is programmed in year 2014 of the Old Colony TIP.

Route 123 (Belmont Street) at Linwood Street and Lorraine Avenue is another proposed intersection improvement project. This project proposes to improve traffic flow, alleviate traffic congestion, and improve safety on Belmont Street (Route 123) in the area of Linwood Street and Lorraine Avenue. The project includes realigning the intersections to form a single four-legged intersection, the installation of traffic signals, sidewalk and pedestrian improvements, and a pull-out area for transit vehicles. The project cost is currently estimated at \$2,382,186. The project is programmed in year 2015 of the Old Colony TIP.

East Bridgewater

The Town of East Bridgewater seeks bicycle lanes from Whitman to Bridgewater along Route 18. Along with bike lanes, the Town of East Bridgewater would also like to see sidewalks along Route 18 from Whitman to Bridgewater. Streetscape improvements are needed at the Town Center along with bicycle racks. Bicycle racks also need to be installed at the Town Hall. The streetscape improvements at the Town Center would include sidewalks, bicycle sharrows, and improved street crossings. An example of



Figure 8: Bicycle Lane

bicycle sharrows and bicycle lanes are located in **Figures 8 and 9**.

Easton

The Town of Easton showed much enthusiasm for bicycle lanes and bicycle sharrows for State and Town owned roadways. These are identified in the Easton Recommendations map following the Level of Service maps. Along with bike lanes, the Town of Easton would like to incorporate the Complete Streets concept in the Town's transportation project cycle (particularly during the resurfacing of the Town's roads that are recommended for bicycle lanes). Easton currently has two schools enrolled in the Safe Routes to School (SRTS) program; F.L. Olmstead School and H.H. Richardson School. It is recommended that the remaining schools in town enroll in the SRTS program.

There are multiple locations where bicycle racks should be provided. These locations are as follows:

- Along Route 138
- Town Library
- Frothingham Park
- Town Hall
- Ames Long Pond
- Town Center
- Highlands Plaza (Target, Hannaford Supermarket)
- Borderland State Park (Bay Road Entrance)
- Schools throughout town

There is a possibility to create a multi-use trail running through the Town Forest that would connect the school campus with Borderland State Park. This would give children who live in the Northwestern part of Town the opportunity to bike or walk safely to school without having to worry about vehicle traffic. This trail could benefit local students as well as residents. Residents looking to go to Borderland State Park could access this trail to get to the park in a safe and timely manner. It eliminates the need to travel on narrow roads like Lincoln Street and Bay Road.

To complement bicycle lanes in the Town of Easton, bicycle boxes at certain signalized intersections are



Figure 9: Bicycle Sharrows



Figure 10: Bicycle Box

recommended. The intersections where bicycle boxes are recommended are at Washington Street (Route 138) & Main Street, Washington Street (Route 138) & Belmont Street (Route 123), and Washington Street (Route 138) & Foundry Street (Route 106). An example of a bicycle Box is illustrated in **Figure 10**. To educate residents in the Town about bicycle boxes and other bicycle and pedestrian safety measures, it is recommended that Easton initiate a town-wide bicycle and pedestrian educational campaign that will involve local media, advertisements, events, etc.

Proposed Projects in Easton

The intersection of Foundry Street (Route 106) at Route 138 is currently a signalized, four-legged intersection in southeastern Easton. The project proposes to alleviate congestion and improve safety through the replacement of the existing traffic signal system, geometric improvements, and sidewalk and crosswalk improvements. The project is currently programmed in year 2015 on the Old Colony TIP and has an estimated cost of \$1,278, 174.

Halifax

The Town of Halifax is focused on expanding bike paths throughout town. All of Elm Street, through Franklin Street, would obtain a bicycle path. Along with these roads, Route 106 would get a bike path from the western part of town (Bridgewater), to the eastern part of town (Plympton). Another major road where Halifax would like to see a bike path is on Route 58. These recommendations would provide added safety for bicyclists as well as pedestrians. These routes are illustrated in the Halifax Recommendations map. The Halifax Elementary School is a partner in the Safe Routes to School Program and is located on Route 106. The school would benefit from the added bike lanes making the journey from the students' homes to school safer.

Hanson

In the Town of Hanson, they seek sidewalks on roadways surrounding two neighborhoods. The first neighborhood is north of Route 14. The surrounding roads that would receive sidewalks consist of Winter Street, Brook Street, Cross Street, Crescent Street, and Route 14. The second neighborhood is south of Route 14. The surrounding roads that would receive sidewalks consist of Main Street (Route 27) and High Street. Route 58 all the way to Main Street (Route 27) already has sidewalks, as well as Route 14 between Winter Street and Crescent Street. These sidewalk improvements are illustrated in the Towns Recommendations map.

For all of the existing sidewalks along the neighborhood walking loop, it is suggested that these sidewalks receive an upgrade (ADA compliant curb cuts). The sidewalk to the Hanson MBTA Commuter Rail Station and the sidewalk to the Hanson Middle School via Liberty Street (Route 58) are examples where sidewalks should be upgraded.

Kingston

The Town of Kingston currently has multiple locations where new sidewalks are planned to be installed. One location is on Elm Street from the Plympton Town Line to Silver Lake Drive. Ocean Hill Drive is the second roadway that has sidewalks planned. It is recommended that the Town also install sidewalks from Route 3A to the MBTA Commuter Rail Station and to Independence Mall. A key location where sidewalks and bike lanes should be installed is on Holands Lane. This roadway serves as a direct access to multiple beaches. This would give bicyclists and pedestrians a care free ride to the beach. These recommendations are illustrated on the Kingston Bicycle and Pedestrian improvements map.

Pembroke

The Town of Pembroke has many roads that would be good candidates for bicycle lanes. The bicycle lanes would connect to the Towns of Hanson, Halifax, and Kingston. Pembroke would connect to Hanson via Oldham Street and Maquan Street (Route 14). In the southern part of town, Pembroke would connect with Halifax via Center Street (Route 36), and the Town of Kingston via School Street and Station Street.

Plymouth

On July 31, 2012 a Public Meeting was held at the Plymouth Public Library to inform the public of the Bicycle and Pedestrian Connectivity and Livability Study, and to gather public input in regards to where they would like to see walking/biking trails in the Town of Plymouth. Citizens of the Town of Plymouth provided numerous good ideas of where they would like to see bicycle lanes and/or pedestrian infrastructure. Water Street is a popular destination for tourists, so the citizens see a big need for bicycle infrastructure and pedestrian improvements in this area. ADA compliant curb cuts are a must for downtown Plymouth. With all of the special events that this town holds, it is highly recommended to make these sidewalk improvements.

Myles Standish State Forest is a perfect area for biking and walking/hiking. The Town of Plymouth has been mapping out hiking trails throughout the State Forest and beyond. Ultimately, The Town of Plymouth would like to join paths with The Town of Bourne and connect all the way to the Cape Cod Canal Bike Path. It is recommended that these trails become dedicated hiking/mountain biking trails by use of signage. These trails would serve as a great escape for pedestrians to get away from the busy streets of Plymouth and not have to worry about vehicular traffic.

Proposed Projects in Plymouth

The Samoset Street reconstruction project consists of the reconstruction of a 0.83 mile section of Samoset Street from Court Street (Route 3A) to Route 3. The reconstruction of the intersection of Samoset Street (Route 44) at Court Street (Route 3A) is included in the larger Samoset Street reconstruction project. Improvements to this intersection include the replacement of the existing traffic signal system along with geometric, bicycle, and pedestrian improvements. The Samoset Street reconstruction project is currently programmed in year 2013 of the Old Colony TIP and has an estimated

total project cost of \$4,318,290. Improvements specific to this intersection are estimated to account for approximately \$1,000,000 of the total project cost.

Plympton

The Town of Plympton, similar to other towns in the region, is in need of bicycle lanes and/or bicycle sharrows. Plympton and Halifax would connect with bicycle lanes and/or sharrows via Palmer Road (Route 58), Center Street, and County Road (Route 106). Country Road (Route 106) would also connect Plympton with Kingston via a bicycle lane and/or sharrow. Another bicycle lane and/or sharrow that would connect Plympton to Kingston would be on Brook Street. Sidewalks and crosswalks should be installed around the location of Dennett Elementary School.

Stoughton

The Town of Stoughton is in need of many sidewalk repairs/installations. With many schools in a close proximity to one another, it is necessary that they have accommodations for children that walk to school. The improvements recommended for sidewalks/crosswalks are as follows:

- Improve street lighting at crosswalks in the Town Center
- Improve crosswalk in front of the United States Post Office
- Complete sidewalks in front of West School on Central Street from Evan Drive to the Canton Town Line
- Improve sidewalks on Pearl Street from Canton Town Line to Central Street
- Complete sidewalks on Plain Street from Swanson Street to Bay Road
- Create ADA compliant sidewalks in front of Senior Housing on Central Street

Improvement of pedestrian amenities at the Canton Street and School Street intersection is also recommended. These improvements would include an intersection redesign and pedestrian safety improvements (ADA compliant sidewalks, crosswalks, etc.). At the Town Center, it is recommended that the bus stop be improved. The improvements would include a dedicated pull-out area for buses, benches for pedestrians, and adequate street lighting for safety. Along with pedestrian amenities, the Town of Stoughton would like to see bicycle lanes throughout the town. You can see the suggested routes illustrated in the Towns Recommendations map.

West Bridgewater

The Town of West Bridgewater seeks sidewalks and bike lanes on Howard Street, South Street, and Route 106. Once Howard Street turns into South Street it is recommended that the sidewalks and bike lanes go all the way down to the Bridgewater Town Line. Currently, on Route 106, there are sidewalks heading westbound towards Easton, but there are none heading eastbound towards East Bridgewater. It is recommended that sidewalks be installed on Route 106 heading eastbound towards East Bridgewater. For the sidewalks already installed heading westbound, it is recommended that these sidewalks receive upgrades.

Proposed Projects in West Bridgewater

The proposed project in West Bridgewater concerns the realignment and reconstruction of Central Square in West Bridgewater. As designed, the new geometric layout will include two signalized four-legged intersections, controlled by a single traffic control box. The project is expected to yield significant air quality and safety improvements in the area. The project is currently programmed in year 2013 of the Old Colony TIP, and has an estimated total cost of \$2,805,959.

Whitman

The Town of Whitman seeks bicycle and pedestrian improvements along areas that connect to outdoor activities and nature preserve areas. This would include connecting to Plymouth Street (Route 58) via Essex Street, Raynor Avenue, Pleasant Street, and South Avenue. Auburn Street would also be included as it connects to School and South Avenue. The Town of Whitman would also like to see bicycle and pedestrian improvements along Route 18 as it is the north/south connector. It is recommended that the Town also make improvements along Route 27 as it is the east/west connector with Brockton to the west and Hanson to the east.

Federal Funding Sources

Surface Transportation Program (STP)

This program may be used for construction of bicycle and pedestrian facilities or for safety-related non-construction activities such as maps and brochures. Activities must be primarily transportation oriented (as opposed to recreation oriented) and consistent with the plans of the Region and the State.

Transportation Enhancements Program

Funds are available for the provision of facilities for bicyclists and pedestrians and the reservation of abandoned railway corridors including the use thereof for pedestrian and bicycle trails. Projects should be primarily transportation oriented and be part of a route that connects urban employment centers and other major trip generators. These projects must be listed in the Transportation Improvement Program (TIP), and be consistent with the goals and objectives of the Regional Transportation Plan and the state in order to be eligible for this type of funding. It should be noted, however, that compliance with the above-mentioned conditions does not guarantee that a project will be funded. Projects listed in the TIP compete for funding against all other projects, and all projects are evaluated on a standardized criteria evaluation program.

Highway Safety Improvement Program (HSIP)

This program makes available funds for projects that improve the safety of bicyclists and pedestrians.

Congestion Mitigation and Air Quality (CMAQ) Improvement Program

This program is available in Massachusetts since the State has not yet attained the clean air standards established under the Clean Air Act. Funds from this program may be used for activities aimed at increasing the use of non-motorized modes of transportation including bicycle and pedestrian facilities. Activities must be transportation-oriented and consistent with the plans of the Region and State. Activities seeking funding must also demonstrate a projected reduction in airborne pollutants (CO, NOx, and VOCs) directly related to the proposed activity.

Safe Routes to School

These funds may be used for infrastructure projects on non-infrastructure projects that enable and encourage children to walk and bike to elementary and middle schools.

Next Step

As stated in the 2012 Regional Transportation Plan (RTP), the Bicycle and Pedestrian Connectivity and Livability Study will serve to inform each community of bicycle and pedestrian improvements/recommendations. The RTP sets the region's transportation priorities and policies for the next twenty-five years. This Bicycle and Pedestrian Connectivity and Livability Study serves as one component of the plan. Together they form a comprehensive vision for addressing our region's transportation issues and ultimately our economic health and quality of life.

To further the support of bicycle usage in the region, the forthcoming Old Colony Regional Bicycle Parking Program will support communities with the purchasing of bicycle racks. The OCPC Bicycle Parking Program consists of providing full reimbursement of the cost of purchasing bicycle racks (excluding shipping and installation costs) for all communities in the OCPC's region. The Old Colony MPO, the Massachusetts Department of Transportation, and the Federal Highway Administration will provide the funding through the Transportation Enhancement Program (TE) or Congestion Mitigation and Air Quality Improvement Program (CMAQ) for the first year, and for the remaining three years using CMAQ funding subject to approval. Approved applicants may order racks through any combination of the approved bicycle parking vendors. OCPC will select specific racks within each vendor's catalog that meet minimum standards for secure and safe parking.

The Massachusetts Safe Routes to School Program encourages safe, healthy trip options for travel to and from school. The program collaborates with superintendents, public officials, principals, teachers, school organizations, students, community stakeholders, and neighbors. Successful Safe Routes to School initiatives include the five E's: education, encouragement, enforcement, engineering, and evaluation. As stated before, the Old Colony Planning Council highly encourages schools in the region to join this program.

It is recommended that each community review these recommendations and to decide which ones they would like to pursue. When the communities arrive at a decision, the Old Colony Planning Council is available to assist with grant applications to get these bicycle and pedestrian projects completed.

Appendix A: Bicycle Level of Service/Pedestrian Level of Service OS Data Input Fields

The following provides further information on the BLOS and PLOS data inputs. Roadway parameters will often change, and averaging could be done depending on the situation.

Through lanes per direction:	Do not include medians, turn lanes, or continuous-left-turn lanes.
Width of outside travel lane, to outside stripe (in feet):	Width of right-most travel lane, excluding striped paved shoulders, bike lanes, and marked parking stalls.
Paved shoulder, bike lane, OR marked parking area, outside lane stripe to pavement edge (in feet):	Besides a paved shoulder or a bike lane, this width may also be marked (striped or hashed) parking stalls. For diagonal parking, use the perpendicular distance from the end of the parking stripes to the pavement edge. This calculator does not work when there are BOTH bike lanes and parking stalls - please see the reference for this case.
Bi-directional Traffic Volume (in ADT):	Daily average. Assumed Directional factor (0.565) and Peak Hour Factor (0.091) values are used in a conversion to peak 15-minute volume.
Percentage of heavy vehicles:	As defined in the Highway Capacity Manual.
Percentage of road segment with occupied on-street parking:	Exclude driveways. Either one side or an average of both sides may be considered at a time.
Percentage of segment with sidewalks:	Again, either one side or an average of both sides may be considered.
Sidewalk width (in feet):	If a sidepath bike trail exists instead of a sidewalk, use its width.
Sidewalk buffer/parkway width (in feet):	Average distance from pavement edge to sidewalk edge. Include any gutter pan width.
Buffer/parkway average tree spacing (in feet):	Between tree trunks.

Model parameter ranges

The BLOS model was developed using roads with the following parameter ranges:

- Through lanes per direction - 1 to 3 (2 to 6 lane roads)
- Width of outside travel lane, to outside stripe - 10 to 16 feet
- Paved shoulder or bike lane, outside lane stripe to pavement edge - 0 to 10 feet (no rumble strips)
- Bi-directional traffic volume - 550 to 36,000 ADT (Average Daily Traffic)
- Posted speed limit - 25 to 50 mph
- Percentage of heavy vehicles - 0 to 10%
- FHWA's pavement condition rating - 5 (very good) to 2 (poor)

- A wide range of development types and parking conditions

(Be aware of model use outside these ranges, particularly for paved shoulders much over 6 feet and more than a few percent heavy vehicles.)

The parameter ranges used in developing the PLOS model include:

- Through lanes per direction - 1 to 2 (2 to 4 lane roads)
- Bi-directional traffic volume - 200 to 18,000 ADT (Average Daily Traffic)
- Traffic speeds - 15 to 75 mph
- Percentage of heavy vehicles - 0 to 10%
- Ranges of development types, road widths, paved shoulders and bike lanes, on-street parking percentages, sidewalk widths and sidewalk buffer widths and types

Appendix B: Pedestrian Infrastructure Index Input Variables and Scoring Criteria

Input Variable	Input Description	Scoring Description
Total # of Lanes at the Intersection	Total number of lanes, both approach and exit lanes for the entire intersection	Fewer than 9 lanes = 4 points 9 to 12 lanes = 3 points 13 to 16 lanes = 2 points 17 to 20 lanes = 1 point 21 or more lanes = 0 points
Greatest # of Lanes Across Any Road	Total number of lanes, both approach and exit lanes for the largest road	Fewer than 3 lanes = 4 points 3 lanes = 3 points 4 lanes = 2 points 5 lanes = 1 point 6 or more lanes = 0 points
Left Turn Lanes	Total number of dedicated left turn lanes	No left turn lanes = 4 points 1 left turn lane = 3 points 2 left turn lanes = 2 points 3 left turn lanes = 1 point 4 or more left turn lanes = 0 points
Right Turn Channel	Total number of separated right turn lanes	No right turn lanes = 4 points 1 right turn lane = 3 points 2 right turn lanes = 2 points 3 right turn lanes = 1 point 4 or more right turn lanes = 0 points
Right on Red Prohibited	Total number of approaches with "No Right On Red" signing	4 approaches or more with "no right on red" = 4 points 3 approaches with "no right on red" = 3 points 2 approaches with "no right on red" = 2 points 1 approach with "no right on red" = 1 point 0 approaches = 0 points
Signal Phasing	Single phased signal = S Multiple phased signal = M	Multi-phase signal (M) = 1 point Single phase signal (S) = 0 points
Crosswalks Present	Total number of crosswalks	4 crosswalks = 4 points 3 crosswalks = 3 points 2 crosswalks = 2 points 1 crosswalks = 1 point 0 crosswalks = 0 points
Crosswalk Type	Total number of crosswalks better than parallel white line crosswalk	4 enhanced crosswalks = 4 points 3 enhanced crosswalks = 3 points 2 enhanced crosswalks = 2 points 1 enhanced crosswalks = 1 point 0 enhanced crosswalks = 0 points
Crosswalk Condition	Good condition / highly visible = G Fairly good condition / easily visible = FG Fair condition / visible = F Poor condition / barely visible = P	Good condition (G) = 3 points Fairly good condition (FG) = 2 points Fair condition (F) = 1 point Poor condition (P) = 0 points
Pedestrian Buttons	Total number of pedestrian on-call buttons	7 or more buttons = 4 points 5 to 6 buttons = 3 points 3 to 4 buttons = 2 points 1 to 2 buttons = 1 point 0 buttons = 0 points
Accessible Pedestrain Buttons	Total number of accessible pedestrian on-call buttons	7 or more buttons = 4 points 5 to 6 buttons = 3 points 3 to 4 buttons = 2 points 1 to 2 buttons = 1 point 0 buttons = 0 points

Appendix B: Pedestrian Infrastructure Index Input Variables and Scoring Criteria

Pedestrian Signals	Total number of pedestrian crossing signal heads	7 or more crossing signal heads = 4 points 5 to 6 crossing signal heads = 3 points 3 to 4 crossing signal heads = 2 points 1 to 2 crossing signal heads = 1 point 0 crossing signal heads = 0 points
Sidewalks	Total number of crosswalk approaches at the intersection	7 or more sidewalk legs = 4 points 5 to 6 sidewalk legs = 3 points 3 to 4 sidewalk legs = 2 points 1 to 2 sidewalk legs = 1 point 0 sidewalk legs = 0 points
Approach Grade	<u>Grade of the steepest approach</u> Level grade = 4 Mild grade = 3 Sloped approach = 2	Level grade (4) = 3 points Mild grade (3) = 2 points Sloped approach (2) = 1 point Steep grade (1) = 0 points
Blocked Views	Total number of vehicular approaches with blocked views of pedestrian waiting to cross	No blocked sight lines = 4 points 1 blocked sight line = 3 points 2 blocked sight lines = 2 points 3 blocked sight lines = 1 point 4 blocked sight lines = 0 points
ADA Compliant Curb Cuts	Total number of curb cuts that are ADA compliant (proper slope, detectable warnings, contrasting materials)	7 or more curb cuts = 4 points 5 to 6 curb cuts = 3 points 3 to 4 curb cuts = 2 points 1 to 2 curb cuts = 1 point 0 curb cuts = 0 points
ADA Compliant Refuge Islands	Total number of curb cuts that are ADA compliant (proper slope, detectable warnings, contrasting materials)	4 pedestrian islands = 4 points 3 pedestrian islands = 3 points 2 pedestrian islands = 2 points 1 pedestrian islands = 1 point 0 pedestrian islands = 0 points
Turn Radius	<u>A radius estimate for the widest turn</u> Tight turning radius (under 10 feet) = 1 Open turning radius (10 to 20 feet) = 2 Wide turning radius (20 to 30 feet) = 3	Tight turning radius (1) = 3 points Open turning radius (2) = 2 points Wide turning radius (3) = 1 point Very wide turning radius (4) = 0 points
Skewed/Offset Intersection	Squared and aligned approach = N Angled or misaligned approach = Y	Not skewed or offset (N) = 1 point Skewed or offset (Y) = 0 points
Lighting	Total number of crossings with lighting	4 lighted crossings = 4 points 3 lighted crossings = 3 points 2 lighted crossings = 2 points 1 lighted crossings = 1 point 0 lighted crossings = 0 points
Special Features	Total number of special features (i.e., chirping signals, highly visible pedestrian crossing warning signage, countdown signals, etc.)	4 or more special features = 4 points 3 special features = 3 points 2 special features = 2 points 1 special features = 1 point 0 special features = 0 points

FFY 2013-2016

Old Colony Transportation Improvement Program (TIP)

Greenhouse Gas Monitoring and Evaluation

Introduction

This section summarizes the greenhouse gas (GHG) impacts that are anticipated to result from the projects that are included in this FFY 2013 – 2016 Old Colony Transportation Improvement Program (TIP). It includes a summary of the state laws and policies that call for reducing greenhouse gas in order to mitigate global climate change, actions that are being to respond to these state laws and policies, the role of regional planning and TIP development in reducing GHG emission and tracking these reductions, and the projected GHG emission impacts from the projects programmed in the TIP.

State Policy Context

The Global Warming Solutions Act (GWSA), which Governor Deval Patrick signed into law in August 2008, makes Massachusetts a leader in setting aggressive and enforceable GHG reduction targets, and implementing policies and initiatives to achieve these targets. In keeping with the law, on December 29, 2010 the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), in consultation with other state agencies and the public, released the Massachusetts *Clean Energy and Climate Plan for 2020*. This implementation plan establishes targets for overall, statewide GHG emissions:

- By 2020: 25 percent reduction below statewide 1990 GHG emission levels
- By 2050: 80 percent reduction below statewide 1990 GHG emission levels

GreenDOT Policy

The transportation sector is the single largest emitter of greenhouse gases, accounting for over a third of GHG emissions, and therefore the transportation sector is a key focus of the *Clean Energy and Climate Plan*. MassDOT's approach to supporting the implementation of the plan is set forth in its GreenDOT Policy Directive, a comprehensive sustainability initiative that sets three principal objectives:

- **Reduce greenhouse gas (GHG) emissions.** MassDOT will achieve this by taking GHG emissions into account in all of its responsibilities, from strategic planning to project design and construction and system operations.
- **Promote the healthy transportation modes of walking, bicycling, and public transit.** MassDOT will achieve this by pursuing multi-modal, “complete streets” design standards; providing choice in transportation services; and by working with MPOs and other partners to prioritize and program a balance of projects that serve drivers, pedestrians, bicyclists, and public transit riders.
- **To support smart growth development.** MassDOT will achieve this by working with MPOs and other partners to make transportation investments that enable denser, smart growth development patterns that support reduced GHG emissions.

GreenDOT Policy and Metropolitan Planning Organizations

The Commonwealth's thirteen metropolitan planning organizations (MPOs) are integrally involved in helping to achieve the GreenDOT goals and supporting the GHG reductions mandated under the GWSA. The MPOs are most directly involved in helping to achieve the GHG emissions reductions under the second goal – to promote healthy transportation modes through prioritizing and programming an appropriate balance of roadway, transit, bicycle and pedestrian investments – and assist in the third goal by supporting smart growth development patterns through the creation of a balanced multi-modal transportation system. This will be realized through the transportation goals and policies espoused in the Regional Transportation Plans (RTPs), the major projects planned in the RTPs, and the mix of new transportation projects that are programmed and implemented through the TIPs. The GHG tracking and evaluation processes enable the MPOs to identify the anticipated GHG impacts of the planned and programmed projects, and also to use GHG impacts as a criterion in prioritizing transportation projects.

Regional GHG Tracking and Evaluation in RTPs

MassDOT coordinated with MPOs and regional planning agency (RPA) staffs on the implementation of GHG tracking and evaluation in development of each MPO's 2035 RTPs, which were adopted in September 2011. In particular, the Old Colony RTP in Chapter 2 – Mission, Goals, Objectives, and Performance Measures, and Chapter 8 – Environmental Quality, Climate Change, Hazards, and Energy, address the topic of climate change and efforts to reduce greenhouse gas emissions.

Working together, MassDOT and the MPOs have attained the following milestones:

- Modeling and long-range statewide projections for GHG emissions resulting from the transportation sector. Using the Boston MPO's regional model and the statewide travel demand model for the remainder of the state, GHG emissions were projected for 2020 no-build and build conditions, and for 2035 no-build and build conditions.
- All of the MPOs included these GHG emission projections in their RTPs, along with a discussion of climate change and a statement of MPO support for reducing GHG emissions as a regional goal.

Project-Level GHG Tracking and Evaluation in the Transportation Improvement Program

It is also important to monitor and evaluate the GHG impacts of the transportation projects that are programmed in the MPO Transportation Improvement Programs (TIP). The TIP includes both the larger, regionally-significant projects from the RTPs, which have already had their aggregate GHG impacts calculated and reported in the RTP, as well as smaller projects that are not included in the RTP but that may nevertheless have impacts on GHG emissions. The principal objective of this tracking is to enable the MPOs to evaluate expected GHG impacts of different projects and to use this information as a criterion for prioritizing and programming projects in future TIPs.

In order to monitor and evaluate the GHG impacts of TIP projects, MassDOT and the MPOs have developed the following approach for identifying anticipated GHG impacts and quantifying GHG impacts of projects, when appropriate, through the TIP. Different types of projects will have different anticipated GHG emissions impacts. The different project categories are outlined on the next two pages with this region's project tracking sheet on the third page.

- Projects with Quantified Impacts

- **RTP Projects** - Major capacity expansion projects (e.g. Green Line Extension, I-95 Whittier Bridge Replacement) would be expected to have a significant impact on GHG emissions. However, these projects are included in the RTPs and analyzed using the statewide model or Boston regional model, which would reflect their GHG impacts. Therefore, no independent TIP calculations are required.
- **Quantified Decrease in Emissions** - Projects that would be expected to produce a measurable decrease in emissions. The approach for calculating these impacts is described below. These projects should be categorized in the following manner:
 - **Quantified Decrease in Emissions from Traffic Operational Improvement** - An intersection reconstruction or signalization project that is projected to reduce delay and congestion.
 - **Quantified Decrease in Emissions from Pedestrian and Bicycle Infrastructure** - A shared-use path that would enable increased walking and biking and decreased vehicle-miles traveled (VMT).
 - **Quantified Decrease in Emissions from New/Additional Transit Service** - A bus or shuttle service that would enable increased transit ridership and decreased VMT
 - **Quantified Decrease in Emissions from a Park and Ride Lot** A park-and-ride lot that would enable increased transit ridership/ increased ridesharing and decreased VMT
 - **Quantified Decrease in Emissions from Bus Replacement** A bus replacement that would directly reduce GHG emissions generated by that bus service.
 - **Quantified Decrease in Emissions from Other Improvement**
- **Quantified Increase in Emissions** – Projects that would be expected to produce a measurable increase in emissions.
- **Calculation of GHG Impacts for TIP Projects** - The Office of Transportation Planning at MassDOT provided the spreadsheets that are used for determining Congestion Management and Air Quality Improvement (CMAQ) eligibility. These spreadsheets require the same inputs as the CMAQ calculations, and have been adapted to provide CO₂ impacts. The data and analysis required for these calculations is available from functional design reports that should be submitted for projects that would produce a measurable GHG impact.
- **Projects with Assumed Impacts**
 - **No Assumed Impact/Negligible Impact on Emission** - Projects that do not change the capacity or use of a facility (e.g. a resurfacing project that restores a roadway to its previous condition, or a bridge rehabilitation/replacement that restores the bridge to its previous condition) would be assumed to have no GHG impact.
 - **Assumed Nominal Decrease in Emissions** - Projects that would be expected to produce a minor decrease in emissions that cannot be calculated with any precision. Examples of such projects include roadway repaving or reconstruction projects that add a new sidewalk or new bike lanes. Such a project would enable increased travel by walking or bicycling, but there may be not data or analysis to support any projections of GHG impacts. These projects should be categorized in the following manner:
 - **Assumed Nominal Decrease in Emissions from Sidewalk Infrastructure**
 - **Assumed Nominal Decrease in Emissions from Bicycle Infrastructure**

- Assumed Nominal Decrease in Emissions from Sidewalk and Bicycle Infrastructure
- Assumed Nominal Decrease in Emissions from Intelligent Transportation Systems (ITS) and/or Traffic Operational Improvements
- Assumed Nominal Decrease in Emissions from Other Improvements
- Assumed Nominal Increase in Emissions - Projects that would be expected to produce a minor increase in emissions that cannot be calculated with any precision.

Regional Greenhouse Gas Impact Summary Tables for FFY 2013 – 2016 Old Colony TIP

The following tables summarize the calculated quantitative and assumed qualitative impacts of the projects included in the regional FFY 2013 – 2016 Old Colony TIP.

2013 Regional Project Tracking

MassDOT Project ID	MassDOT Project Description	GHG Analysis Type	GHG Impact Description	GHG Impact by the Numbers
606519	BROCKTON- SAFE ROUTES TO SCHOOL (BROOKFIELD ELEMENTARY SCHOOL)	Qualitative	Assumed Nominal Decrease in Emissions from Bicycle and Sidewalk Improvements	N/A
	OLD COLONY REGIONAL BICYCLE PARKING PROGRAM (BICYCLE RACK GRANT PROGRAM)	Qualitative	Assumed Nominal Decrease in Emissions from Bicycle Infrastructure	N/A
600426	PLYMOUTH- RECONSTRUCTION OF ROUTE 44 (SAMOSET STREET) FROM ROUTE 3 (NB RAMP) EASTERLY TO WATER STREET	Quantified	Quantified Decrease in Emissions (See Emissions Analysis Appendix)	-175.029 kg Winter CO -4,979.445 kg Summer CO
603457	WEST BRIDGEWATER-INTERSECTION IMPROVEMENTS AT ROUTE 106 & ROUTE 28 (CENTRAL SQUARE)	Quantified	Quantified Decrease in Emissions (See Emissions Analysis Appendix)	-55,775.082 kg Winter CO -1,586,789.018 kg Summer CO
Total Impact Winter (in kilograms)				-55,950.111
Total Impact Summer (in kilograms)				-1,591,768.463

2014 Regional Project Tracking

MassDOT Project ID	MassDOT Project Description	GHG Analysis Type	GHG Impact Description	GHG Impact by the Numbers
603660	BRIDGEWATER- SIGNAL & INTERSECTION IMPROVEMENTS AT STATE ROUTE 18 & HIGH STREET	Quantified	Quantified Decrease in Emissions (See Emissions Analysis Appendix)	-3,304.784 kg Winter CO -94,020.393 kg Summer CO
601644	BROCKTON- RESURFACING & RELATED WORK ON WEST ELM STREET, FROM WARREN AVENUE TO WEST STREET (6,800 FT.)	Quantified	Quantified Decrease in Emissions (See Emissions Analysis Appendix)	-12,609.518 kg Winter CO -358,738.067 kg Summer CO
606071	EASTON- SIGNAL & INTERSECTION IMPROVEMENTS @ ROUTE 138 (TURNPIKE STREET) AND ROUTE 106 (FOUNDRY STREET)	Quantified	Quantified Decrease in Emissions (See Emissions Analysis Appendix)	-2,084.439 kg Winter CO -59,301.843 kg Summer CO
	OLD COLONY REGIONAL BICYCLE PARKING PROGRAM (BICYCLE RACK GRANT PROGRAM)	Qualitative	Assumed Nominal Decrease in Emissions from Bicycle Infrastructure	N/A
		Total Impact Winter (in kilograms)		-17,998.741
		Total Impact Summer (in kilograms)		-512,060.303

2015 Regional Project Tracking

MassDOT Project ID	MassDOT Project Description	GHG Analysis Type	GHG Impact Description	GHG Impact by the Numbers
606036	BROCKTON- SIGNAL & INTERSECTION IMPROVEMENTS @ ROUTE 123 (BELMONT STREET)/LINWOOD STREET/LORRAINE AVENUE	Quantified	Quantified Decrease in Emissions (See Emissions Analysis Appendix)	-2,571.619 kg Winter CO -73,162.015 kg Summer CO
606264	PLYMOUTH- IMPROVEMENTS ON OBERY STREET, FROM SOUTH STREET TO A.A. CARANCI WAY/PLYMOUTH NORTH H.S. DRIVE INTERSECTION	Quantified	Quantified Decrease in Emissions (See Emissions Analysis Appendix)	TBD
		Total Impact Winter (in kilograms)		-2,571.619
		Total Impact Summer (in kilograms)		-73,162.015

2016 Regional Project Tracking

MassDOT Project ID	MassDOT Project Description	GHG Analysis Type	GHG Impact Description	GHG Impact by the Numbers
	OLD COLONY REGIONAL BICYCLE PARKING PROGRAM (BICYCLE RACK GRANT PROGRAM)	Qualitative	Assumed Nominal Decrease in Emissions from Bicycle Infrastructure	N/A
600380	PEMBROKE - REHABILITATION ON ROUTE 36 (CENTER STREET)	Qualitative	Assumed Nominal Decrease in Emissions from Other Improvements	N/A
604957	PEMBROKE- RECONSTRUCTION ON ROUTE 14, FROM THE HANSON T.L. TO WASHINGTON STREET (ROUTE 53) Advance Construction Phase 1	Qualitative	Assumed Nominal Decrease in Emissions from Other Improvements	N/A
			Total Impact Winter (in kilograms)	N/A
			Total Impact Summer (in kilograms)	N/A